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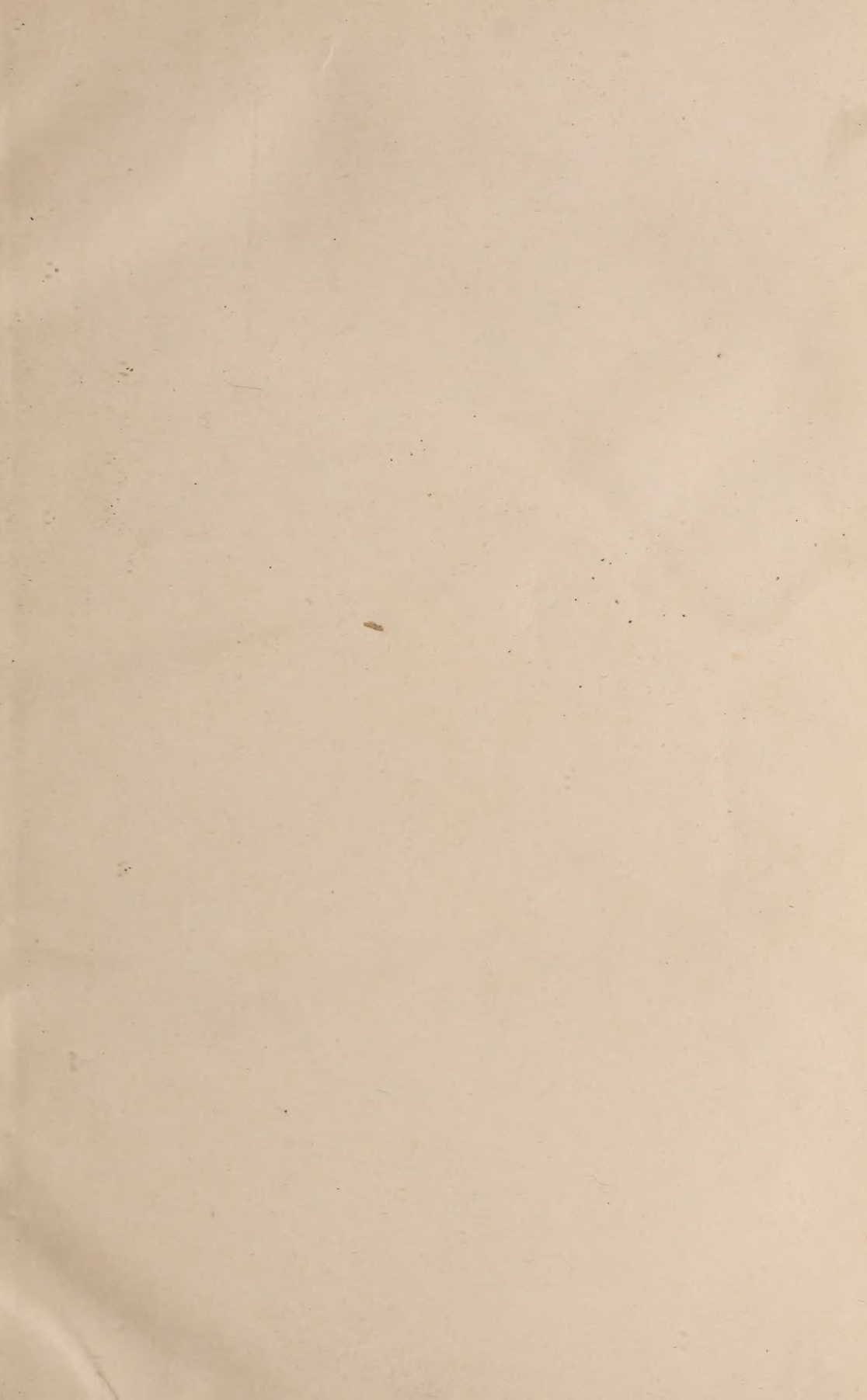

















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# INTERSTATE MEDICAL JOURNAL.

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## EDITORIAL.

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### NEW YEAR'S RESOLUTIONS.

It is well to begin the new year with high resolves and it is well to say unto oneself that no matter how imperfect the past year has been on account of one's lapses from a high moral standard, the coming year will be a much cleaner and a much more instructive chapter for future generations to con with profit. Every year, it can be said without taking undue licence with truth, the majority of us, directly the new year is ushered in, make up our minds to do something that shall be outstanding and to act towards our friends with a greater degree of sympathy and towards our enemies in a less censorious manner. These resolutions increase our importance as living entities and also increase our importance as factors in the social fabric. With what scorn we regard our fellow-men who fail to tell us what changes in their mode of thought and in their mode of living they intend to effect, and who fail to emphasize how certain they are that during the next twelvemonth the dross of yester-year will not be allowed to soil any one of their acts! We are scornful of them because by their silence they proclaim their content with things that are, and are provincial enough to imagine that their smugness is the only goal to be reached. But what irritates us most is that in the innermost recesses of our consciousness we know that our high resolves will be forgotten by us in a few weeks, and that in spite of all our extraordinary promises to ourselves and to others, our smugness will put us in the same class with those who have made no asseverations, but who have been much better philosophers than ourselves.

The modern definition of man differs in no way from the



ancient definition; and though modern writers on the subject say otherwise, physicians know that this is not true. In the ages that are now green with mould, men talked too much, ate too much, drank too much, exercised too much or lazed too much. They had other characteristics in common with us,—those mental traits which we are always resolving to change but as yet have not changed one iota. Hatred was theirs as it is ours; and when they met their enemies at street corners their verbiage was no less restricted than at the present time. They did a deal of gesticulating, no doubt, and did not refrain from using expletives that offended refined ears. Perhaps at times they came to blows, especially if they were members of a medical society or rather if a medical society obtained, and then forgave each other after the fashion of to-day only to bear a grudge for years. And just as was the custom in 1915 and will be the custom in 1916, men vied with each other for reputation and wealth in bitterness and wrath, and paid greater heed to what was thought of them than to the development of those kindly qualities of which the world hears so much in novels and essays and sees so little in real life. They made high resolves around the first of the year and kept them in the desultory manner so characteristic of the present generation, and the result was that their habit of thought in regard to themselves and especially in regard to others never changed. They talked too much, ate too much, drank too much, exercised too much or lazed too much despite their good intentions; and were they with us to-day, could the most discerning critic single them out from the modern crowd?

Let us take up first the subject of talking too much. Who has not heard of the Bollinger case in Chicago, and who has not talked about it? First the Chicago physician talked, then the newspapers talked, then the people talked; and all, it may be mentioned here, too much. Had the Chicago physician refused to operate without giving his reasons, the case would have attracted no attention, the world at large would not have lost its ballast in controversy. But he talked exultingly about his aims,—that is the newspaper in which the original interview appeared stated certain aims to be achieved for the good of society; and a merry war ensued between the eugenists and those thousands upon thousands who have been writing or talking on the rights of infants. This well-advertised case has taught the medical profession and the world at large nothing; it has merely embroiled people who otherwise would have been on good terms. Every physician has the right to refuse to operate, but no

physician has the right to predict that, though the operation is successful, the individual is so decidedly handicapped by other defects that he will be a worthless asset to society. He may think this, but his vocation should not include this prophecy in his ministrations. Too often it has been noted that he is a good operator but a third-rate prophet; and this being the case his rôle of prophet and reformer should be held completely in abeyance. But no doubt the Chicago physician and his friends and his enemies have made New Year's resolutions time and again not to talk too much,—and behold the disastrous results.

In discussing New Year's resolutions the next subject in point of interest is undoubtedly the alluring one of eating too much and the many promises we make to ourselves to curtail the quantity of food. Just why this subject is uppermost in the minds of the majority of people is still a matter of mystery to the writer of these lines, but not only do our friends in our immediate entourage try to impress us with the great advantages that accrue to all who are abstemious, but even our enemies are not averse from showing us what paragons of health they are. Overeating with its untoward results need not be discussed here to show why it should not be encouraged; but what should be discussed is the superior mentality which asserts itself peacock-fashion every time a year is in its swaddling clothes in regard to a resolution to change by a supreme effort a habit which has become quite settled in the course of time. That there have been instances where men and women have been heroic enough to refuse to eat when their superior mentality has guided them with safety through the shoals of keen desire and great temptations cannot be disputed here, but these instances are generally effected by compressing the lips, scowling at food as if it were a poison, and by a disposition that is almost funereal. People of this sort are not the lugubrious objects they are because of New Year's resolutions, but because they want to be different from others; having decided on a certain course in life (diet is only one of many manifestations), they compel themselves to be adamant to all temptations. They do not concern us, but their weaker fellowmen do: those who make resolutions and then break them with dexterity. The latter are human enough to command our interest and attention, and it is to them our laughter goes out when after raising themselves to great heights of abstinence for a few weeks, they fall to earth with a thud.

It is not necessary to take up in detail those of us who drink too much or exercise too much or laze around too much. Not that these



are uninteresting subjects. They *are* interesting and are just as slightly affected by resolutions,—New Year's resolutions are a minor matter in these cases,—as are the others. The man who has been drinking too much is always making resolutions and always breaking them. When he does break them we say he is weak or has dipsomania or is a degenerate. We do not laugh at him; we study him. And a like attitude is ours towards the would-be athlete who overworks his muscles and, not any too seldom, his heart. He does not start the new year necessarily with the firm resolve to exercise before the mirror in the complicated poses guaranteed to develop the muscles, nor does he select that time to say to himself that he must sprint for miles, play golf and lead an outdoor life. The realization of his general flabbiness occurs to him often between sunrise and sunset; and if history would record the many infractions of his stern resolves, we doubt if anyone would have the patience to wade through the doleful tale. Again a subject for deep and learned study, not for laughter. But the lazy man, the man who never exercises must be dismissed with tears and sighs, for he is beyond all resolutions,—a living example of the futility of all reform movements!

Resolutions are not to be sneered at if they are kept, and they should not be lightly thought of if they are not carried too far. A fear of eating too much is as bad as overeating, and a fear of talking too much is much worse than volubility. As for drinking, what man, be he of the rarest judgment, can proclaim with certainty the amount that is conducive to health? It is easy enough to say, do not drink at all; but it is not easy to say in a truthful manner, one drink will not harm you but two will. Perhaps, after all, we physicians do not understand human nature with that degree of perspicacity that should be ours by right of daily contact with men of many sorts. Perhaps we ourselves are but poor examples for others to pattern after, and perhaps we, too, make resolves and break them forthwith. It is no idle rumor that physicians have been known to eat too much, to drink too much, and to exercise not at all. And it is no idle rumor that a considerable number of physicians talk altogether too much,—about their practice, about their extraordinary cases, about their incomes. Can it be denied that they of all people ought to keep their resolutions longer than others, and ought to be shining examples of food and drink abstinence and the kindly spirit of which there are so many evidences in books in which doctors figure but so few in real life?

P. S.

## LITERARY NOTES.

As a rule physicians are not graceful or forceful interpreters of the poetic Muse, the grind of their daily existence being so monotonous that only unornamental prose characterizes their utterances either in speech or in written word. But occasionally one meets a poet among physicians who writes with an intimate knowledge of the Muse, and who wields a pen that is neither mawkish nor halting in an amateurish sense. Such a poet is Dr. L. Pierce Clark in his volume of poems entitled "Warp and Woof" (Hillacre Bookhouse, Riverside, Conn.), on many pages of which are evidences of a rare gift of expression and a wide knowledge of human nature. Let it be understood at once that Dr. Clark does not dangle after the gods and goddesses on Mount Olympus, nor grow rapturous over some hero in history or some heroine who has been unfairly dealt with by chroniclers of small historical beer, and therefore needs a champion. The product of his pen has all the hall-marks of modernity, not only in subject but in treatment; and while those who have their Tennyson and their Byron at their fingers' ends may object to his impressionistic style, there will be many others who will applaud. Some of the poems have only four lines; some six; but none is long. This is a great advantage when the style, crisp and to the point, is taken into consideration, and when the reader realizes to the full the author's happy faculty of telling him a great deal in a small space. To illustrate: the poem "A Sunset Bird" has only six short lines, but in this limited space the author expresses himself with such rare felicity that the reader can at once visualize the scene as it is meant to be. This art the author possesses in a high degree, and it is on account of this gift that we would commend this volume to all those readers who can appreciate the aims and tendencies and good points of modern poetry.

P. S.

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What have not been the controversies in the medical journals about drink, and what have not been the controversies in political circles, humanitarian circles, puritanical circles and all those other circles without which modern existence would not have its many kaleidoscopic features. The man who abhors liquor denounces it and thinks the rest of the world irreclaimable sinners because of their weakness in the face of the startling facts with which he is ever willing to deluge his friends, and the man who takes a drink occasionally has his opinions, too. The drunkard has no opinions, for which we ought to feel grateful; and just because we live in a world filled with nothing but ingratitude we reward him for his silence by making him a pariah, something to be shunned. Occasionally a kind-hearted old gentleman of altruistic tendencies sends him to an institution, but this is not done so often that we may say it is the custom of any one community. Books without number have been written on the subject of the drunkard, and we suppose



the future will not be lacking in a like number, but it has remained for Mr. Vance Thompson to write about the mild drinker in a vein that is so original that were we not in the habit of reading serious works on the drink question we would say here, at last, is a humorous exposition of this burning subject. The title of Mr. Thompson's book has the alluring one of "Drink and Be Sober" (Moffat, Yard and Company, New York), and though one in his right senses and hopeful of the solution of the problem as to how to drink and yet remain sober would be warranted in looking for a justification for taking a drink or two or, even after more, learn by what means one's family can be deceived without resorting to the eating of cloves and making special efforts to steady one's gait, his hopes would be dashed, for the author writes on every page diatribes against liquor in whatever form and with a virulence that is almost tragi-comic. Had the title been "Drink Water and Be Sober" it would have been more to the point; and despite the fact that we have never met Mr. Thompson we are quite sure that though a fairly good writer he is a very poor proof reader, and really forgot to put the word 'water' in the title of his book, or perhaps meant the title for another book that would be less severe on the mild drinker. As is usual in books of this sort the drunkard is greatly pitied, and is soon dismissed as an object that is beyond recall and of so weak a physique and so depraved a mind that his abominable traits cannot be passed on to his children! The mild drinker, on the other hand, is a true menace to society, and it is he, according to the author, who is responsible for his children and his children's children going to a just perdition. One quotation should suffice to convince the reader, be he a mild drinker, what an awful obstacle he is to the modern movement to perfect the human race. Mr. Thompson writes on pp. 229 and 230: "And then—just a moment—who is the worst enemy of the immediacy of this reform [complete abolishment of drink] for which you and I are looking so largely?

"Believe me, he is the man for whom this book is written; he is not the rowdy drunkard, already marked with the plain stigmata of alcoholic dissolution; he is, rather, that smiling, dangerous man who can drink and be sober, thank Heaven! and who, checking alcoholic degeneration in himself, passes on a deadlier degeneration to his daughters and his sons. He is in the forefront for all the arguments for drink. And proudly he poses there and does not see the ignominy of his position.

"How should he see?

"Already he is poisoned atop; morally he is blind-drunk. And mentally he is darkening into irrationality."

P. S.

## ORIGINAL ARTICLES.

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### HYGIENIC AND DIETETIC TREATMENT OF CARDIO-VASCULAR DISEASES.

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By THOMAS E. SATTERTHWAITE, M. D., of New York.

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In the hygienic treatment of cardiac diseases, rest is one of our most valuable remedies. In the acute affections it may obviate the use of drugs, for the supine position, as contrasted with the erect, calls upon the heart to furnish a smaller amount of blood, at shorter intervals, and with less expenditure of force. It has been estimated by Mackenzie that a change of posture from lying down to sitting up increases the pulse-rate four to five beats per minute, while standing up has a still more decided effect. Slow walking raises the rate from the normal to 100, fast walking to 140, and running to 150, the normal output of blood in the recumbent position being increased at least 5 per cent. by sitting up, by standing 8 per cent., by slow walking 40 per cent., and by running over 100 per cent. The blood-pressure also rises from 5 to 10 mm. Hg. when the recumbent is changed for the sitting posture. These figures show plainly how great a saving of cardiac energy is accomplished by rest.

But while rest is generally useful during cardiac inefficiency, and may be necessary for a prolonged period, it has its limitations. For example, while compensation is under way in young children with valvular diseases, they should be kept in bed for several weeks after all signs of cardiac inefficiency have disappeared, and the same rule should apply in the endo- or pericarditis, or heart strain of adults; but in middle or advanced life patients need not be kept at rest until all the signs of inefficiency have passed away. In fact, they will improve more rapidly if allowed, after a reasonable time in bed, to resume gradually some measure of their former activities. In the aged, especially when there is myocardial degeneration, prolonged recumbency may do positive harm.

In these two classes of cases, some passive and, later, active movements should be inaugurated after the immediate danger is over. With such patients, prolonged rest in bed accelerates degenerative processes, retards nature's efforts to rid the system of effete material, and delays recovery in various other ways. Even in



the subacute dilatation of anemic or neurotic boys and girls who have been leading sedentary or inactive lives, exercise of a mild character in the open air, aided perhaps by nutrients like malt, or tonics like iron and arsenic and strychnine, do more to restore the heart's tone and diminish dilatation than complete rest. In fact, after childhood has been passed, the length of the stay in bed becomes less important as the age advances, for after a time other more prominent desiderata are resistance or regulated exercises, a suitable dietary, baths, of which the carbonated are the best, and general or heart tonics.

In the matter of rest in bed, the question of posture must be considered, and it is of considerable consequence. Often mere recumbency in bed will be of little use, the patient needing to be propped up with suitable pillows, or perhaps a bed-rest. In this matter of posture we are confronted with a serious problem. A weak myocardium and insufficient cerebral circulation logically call for the recumbent position, but the patient may object because it gives him more discomfort than a sitting posture or even standing up. Berg (*Medical Record*, April 8th, 1911) in commenting on this fact gives two reasons in support of the patient's objections. In the first place, the desire for the erect position or something approaching it is a result of the increase in the anteroposterior diameter of the thorax which takes place in such a position, the increase in adults being from one-half to three-quarters of an inch, and in younger persons as much proportionately. For in this posture there is increased convexity of the spine, while in the recumbent position the weight of the body flattens the spine and the posterior section of the chest wall. On the other hand, there is also an increase in the long diameter of the thoracic cavity in the erect position, due to the displacement downwards of the diaphragm, liver, stomach and intestines. As the heart is capable of being moved up and down and from side to side, it naturally lies somewhat higher when in the recumbent position, and is also turned somewhat on its side, while in assuming the erect posture it takes a more vertical position. If it is hypertrophied or dilated, the apex has a tendency to impinge on the left wall of the chest, especially when the patient lies on the left side; in fact, this posture may even bring on angina, which is relieved by turning over and lying on the right side. The erect position, which permits the heart to be more vertical, allows it to hang comparatively free, so that its movements are less embarrassed. This pressure against the heart and lungs, pushing them upward and turning the apex to the left, is common in obesity and in relaxed conditions of the system.

These reasons explain why many persons feel discomfort in the recumbent position. In fact, the patient will experiment to find the posture that most satisfactorily relieves the heart from up-

ward pressure, while still demanding less work of it than when the body is erect; and when he has discovered the angle at which the thoracic contents can functionate best, it is well to let him choose his own posture. To assist still further in the matter, Dr. Berg advocates raising the head of the bed, so that the patient occupies to some extent the reversed Trendelenburg position. This method he has used successfully in conjunction with an inclined bed-rest, and has found also that it promotes the flow of serum when using Southey's tubes.

Even before the patient leaves his bed, a few resistance exercises may be given preparatory to his getting up, and to fit him for further activities. Also at first he should take a few steps only, then more from day to day, and finally a short walk on the level in the open air, the distance being increased from day to day. If, however, the exercise induces a pulse-rate more rapid than is normal under the circumstances, or too hurried breathing, the patient should rest at intervals. If the embarrassment is not sufficiently relieved in this way, exercise may be omitted for a day, and then resumed. Progress in convalescence is usually slow.

The late Dr. Forchheimer has given some useful suggestions along these lines. After noting the rate and regularity of the pulse, he generally began with massage and resistance exercises, at first with very mild force, which was gradually increased. During the first week the patient was allowed to sit up in bed, at first for a short time only, then for a longer, until only the normal change in pulse-rate was noted. After about a week of treatment, sometimes sooner, sometimes later, the patient was allowed to leave the bed and sit up in a chair. The pulse-rate was his guide to the condition of the heart; if there was an increase of about 20 beats to the minute, the rate was considered abnormal. After the patient had sat up in a chair for gradually increasing periods of time, he was permitted to walk, at first short distances, then longer, and finally to leave the room. Then he was allowed to walk down stairs, go out for a drive, and finally to walk up stairs. After he was able to go about, a few weeks' change of air was found to aid his recovery materially.

After efficiency has been established, it is sometimes difficult to determine the kind and amount of exercise to be taken daily. Walking is good. Usually I make my patients walk at least two miles a day; three should be the limit. Occasional horseback exercise is permissible, or one may ride a wheel, but only on the level. Rowing a pleasure boat is allowable, but racing or athletic competition of any sort cannot be too strongly interdicted, especially where there is dilatation.

I am opposed to the use of massage in heart diseases, for the reason that resistance exercises are more effectual and safer, since



the average masseur is so anxious to accomplish obvious results that he is apt to overdo the treatment. For this reason massage, and indeed resistance exercises, are best given by women; they are more gentle, and at the same time more careful in following out the orders of a physician.

The use of the high-frequency current in hypertension I believe to be of great value. I have employed it for several years. How far electricity in other forms is applicable in cardiovascular diseases is a matter of which we know little. But the action of the high-frequency current is both tonic and sedative, and brilliant results may be obtained from it.

Radium is not advisable in cardiac weakness, according to Von Noorden, and he has had unusual opportunities for studying its therapeutic uses.

It is important to know that so far as locality is concerned, the inefficient heart is best suited by an altitude not much above the level of the sea. At the same time, the climate should be mild, equable, and dry, and the air salubrious. There are numerous places along our sea coast, especially in the evergreen zones, where these conditions are found. As a rule, a locality more than 1,500 ft. above the sea level should not be selected. The weak heart may often do well in greater altitudes, but it takes some time for it to become accustomed to the higher elevation.

As treatment in any form of heart disease, whether acute or chronic, covers a comparatively long period, every effort should be made to have the patient's mind withdrawn from his ailment, as far as is practicable. He should have bright quarters, cheerful surroundings, agreeable companionship, and mild forms of diversion that do not entail increased outlay of cardiac strength, but tend to soothe and steady the organ. The amount and kind of amusement must of course be suited to the individual. Moreover, physical must be combined with mental rest; worries and excitement of any kind are often disastrous; and a sudden shock may kill, for a weak myocardium may not be able to withstand it.

As tobacco is a frequent cause of irregular action of the heart, its use should be interdicted.

In all cases of cardiac inefficiency there is incomplete elimination; one or other of the excretory organs is deficient in activity. The skin is apt to be dry and sluggish, especially in lithemic cases, the bowels being usually torpid or the evacuations irregular in time and amount, showing signs of fermentation or imperfect digestion. Often there is renal inadequacy. This is very common in the later stages of cardiac disease, and it is also a pronounced element in arteriosclerosis.

Inactivity of the skin is relieved by warm baths, especially the Nauheim. The salts act for the most part mechanically and so

stimulate the superficial circulation. Friction and massage are also useful here, although, as I have already intimated, I seldom prescribe massage in heart troubles, because of the necessity for having a specially trained operator, if cardiac disturbances are to be avoided. If the skin is rough some emollient may be necessary.

The bowels should be moved daily,—better, twice a day,—and the evacuations should be inspected to find out how far and in what way they are abnormal, so that dietary errors may be corrected. At the outset of the treatment I often give adult patients, twice a week, a grain of calomel in divided doses, followed by a saline purgative. For subsequent use, as may be indicated, I am rather in the habit of depending on podophyllum or phenolphthalein, or a combination of them, two or more times a week. If there is intestinal stasis, I am apt to prescribe a colonic injection twice a week.

It is seldom that a diuretic has to be used, because digitalis, nitroglycerine, caffeine, colonic injections, or a milk diet usually obviate the necessity. To some extent I rely also on the iodide of sodium, especially when there is dropsy; occasionally I use diuretin. Hot applications to the loins may occasionally be necessary, in acute attacks.

Venesection is rarely resorted to in cardiac disease, but according to Daland (*Journal of the American Medical Association*, August 29th, 1908) it is especially indicated in certain valvular diseases when there is well-marked failure of compensation, with edema, dyspnea, cyanosis, and tumultuous heart action, if these signs are progressive despite the administration of ordinary cardiovascular remedies. If there is no well-marked degeneration of the myocardium, the relief should, he thinks, be immediate and satisfactory. Even though the effect may be only temporary, it may enable cardiac remedies to become effective. Twenty ounces of blood from the median cephalic vein should be drawn. In acute pulmonary edema, even where the patient was almost moribund, Daland has known recovery to follow venesection. In failure of compensation in arteriosclerosis he believes the procedure to be of great value, and in aneurysm of the aorta, where dyspnea and pain are present, abstraction of eight to ten ounces of blood may give temporary relief. In well-marked myocardial degeneration, however, he holds venesection to be valueless. Views similar to his are held to some extent in England. Personally, I have had no experience with venesection in any of these conditions.

With regard to diet in heart affections, in acute forms nothing but fluids should be given. If milk is well borne, it may be taken to the amount of one and one-half to two quarts a day; often one quart will suffice. A few prefer buttermilk, or some other form of sour milk. Bulgarian sour milk is popular and useful. In many

cases I am in the habit of giving plain or sour milk to the amount of one to two quarts per day, with Vichy or an alkaline water, half and half. For those who cannot take plain milk this combination is usually agreeable.

The Karell treatment, introduced by J. Karell, has met with a great deal of favor. It has been employed by Lenhartz at his clinic in Hamburg for over eighteen years. During the first six days of treatment, 200 c.cm. (7 oz.) of milk,—boiled or raw, hot or cold,—are given at 8 a. m., 12 m., 4 and 8 p. m.; in all, 800 c.cm. (28 oz.). During this period no other fluid or solid is allowed. During the following two to six days, one egg is given at 10 a. m., and a zwieback at 6 p. m.; afterwards two eggs and bread, and later a little chopped meat, vegetables, or rice pudding, until at the end of the twelfth day the ordinary diet is resumed. During this form of treatment the bowels should be kept open.

In cardiac diseases the amount of food should be carefully regulated and adapted to individual needs. It is impossible to give dietaries that will cover the requirements in all instances. The patient's age, constitution, and idiosyncrasies have to be taken into consideration. A fundamental rule which is always applicable, however, is that the diet should be sparing. If the patient is kept in bed, food should be given at intervals of two to four hours. The last meal should be simple, and taken not less than two or three hours before retiring.

Foods difficult of digestion or liable to produce fermentation should be avoided. They cause gastro-intestinal disturbance, which embarrasses both the respiration and the circulation. In cardiac inefficiency there is passive congestion of the liver, kidneys, and chylopoietic viscera, and the dietary should be such that the burden of elimination imposed on these organs is as slight as possible. Red meats and starchy foods are the chief causes of gastro-intestinal disturbances.

Except in emergencies where other remedies are not available, alcoholic and malt liquors should not be taken. Even where hard drinkers have cardiac incompetency, no alcoholic stimulants should be allowed. Just as in any form of physical or mental strain, it is best not to rely on them; they only give temporary relief at best, and then at the expense of the gastro-intestinal and nervous systems.

Coffee should be prohibited, and tea as well, unless it is weak and in small quantities. Most of the advertised substitutes for coffee contain a small amount of caffeine, and are therefore objectionable. Among those that are quite free from it are Dekafa and Postum. The latter is made from wheat, with from three to ten per cent. of



pure New Orleans molasses. Chocolate is not a desirable beverage for heart patients, as it is constipating.

After having taken into consideration individual idiosyncrasies, it is important to diminish the intake of carbohydrates, which are the usual cause of fermentation; and of red meat, which is the most indigestible of the nitrogenous foods; otherwise, stomachic and intestinal anti-fermentatives will probably have to be in regular use.

Among persons in middle life, there is a tendency to overeat. Such patients will do well to observe the rule always to rise from the table before the appetite is entirely satisfied, for acute attacks of indigestion in such cases may prove a serious matter. Eating too heartily when very tired, or when the digestion is weak, is also a practice to be sedulously avoided, and the same is true of the tendency often seen in aged persons to eat so rapidly that their food is not properly masticated. Such habits are likely to cause very serious attacks of acute indigestion, with production of gas, distending the stomach and intestines, and causing pressure on the heart which sometimes interferes so seriously with its action that death results.

With regard to the ingestion of fluids, the lithemic condition, or whatever we may choose to call it, is so commonly held responsible for many of the associated conditions occurring in chronic heart affections, that to counteract it, if for no other reason, water should be taken freely. On the other hand, it must be remembered that as the heart has to pump the water through the kidneys, liquids if taken too freely are an additional burden to a weak heart.

## CONGENITAL CIRRHOSIS OF THE LIVER.

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*History.*—W. M. L., *æt.* three and a half weeks, was admitted to the wards of the Infants' Hospital on November 9th, 1914, for jaundice and distention of the abdomen. The father and mother of the baby were both well, and the latter had had no other children and no miscarriages. The baby was born at full term, low forceps delivery. He appeared vigorous and cried strongly at birth and seemed normal in every way except for forceps marks on the head and face, which healed rapidly. Breast feeding was started on the second day. On the third day the meconium cleared and the stools became yellow and normal in appearance. The baby had slight snuffles from the fifth to the eleventh day. On the fifth day the stools became greenish and undigested with curds. At this time he had slight fever, which lasted from the fifth to the tenth day, the maximum temperature reached being 102° F. He has had no fever, however, since October 25th.

On the twelfth day, October 27th, the baby became slightly jaundiced, the jaundice showing itself in a slight yellow tint of the skin and conjunctivæ. The movements were still undigested and the baby was taken off the breast because the attendant physician thought that the high protein in the breast milk was the cause of the trouble. The baby was given Allenbury's food without milk, under which feeding the movements became well digested, but were of a very light clay-colored appearance. He was next seen on November 4th by his physician, who found his temperature normal. The baby at this time was markedly jaundiced. The abdomen was slightly distended, the movements were clay colored, the urine was dark, and the bowels were constipated. The condition at this time was considered fairly satisfactory because the baby was gaining quite rapidly in weight. He was next seen on November 8th, one day previous to his admission to the hospital. At this visit the abdomen was found markedly distended, shiny, and with prominent veins in the abdominal wall. A consultation was held and the patient was sent to the Infants' Hospital for observation.

*Physical Examination.*—On admission to the hospital the temperature was 97° F., the pulse 130, respiration 37. The baby was well developed and well nourished, and seemed bright and active.

He lay with his head drawn back, evidently in discomfort, with short and somewhat labored respiration. The skin showed everywhere an intense greenish yellow icterus. There was a marked yellowish tint in the conjunctivæ. The skin of the buttocks was somewhat red and excoriated. There were no fissures about the lips or the anus. The cranium was of good shape, and the anterior fontanel was level, measuring 2x2 cm. The pupils were equal and reacted normally. The nose, ears, mouth, and throat were normal. The chest was symmetrical, and examination of the heart and lungs revealed nothing abnormal. The abdomen was markedly distended and very tense, tympanitic in the central portion with dullness in the flanks, which shifted with change of position. The skin of the abdominal wall was edematous, and the veins over the upper part of the abdomen were markedly distended. The edge of the liver was felt 5 cm. below the costal margin in the nipple line. The upper border of the liver dullness was at the 5th rib. The spleen was not palpable. There was a small umbilical hernia. The lower extremities showed a moderate edema, but there was no edema of the face or upper extremities. The reflexes were normal. Examination of the blood showed a leucocytosis of 35,000. Examination of the urine showed nothing abnormal, except a marked reaction for bile. Examination of the stools showed that the test for bile was negative to nitric acid, Hammerstein's reagent, and to the bichloride test.

Attempts were made to relieve the distention by means of enemas and stools, but without success. During the night the patient had three convulsions, and the general condition became worse. On November 10th it was decided to operate.

*Operation.*—An incision was made at the upper border of the right rectus muscle at the level of the umbilicus. The skin of the abdomen was markedly edematous. On opening the peritoneum a large amount of bile-stained fluid escaped. The intestines were found slightly distended with gas, but otherwise not abnormal, and there was no narrowing or evidence of obstruction. The liver appeared large, dark-red, and of rough surface. The gall-bladder was normal in size. It was opened and a drainage tube was inserted. No other abnormality was found.

*Subsequent Course.*—The patient rallied well from the operation, and the condition remained unchanged for several days. There was free draining both from the abdominal wound and from the tube in the gall-bladder. The temperature remained subnormal. There was occasional vomiting. The stools continued to show the absence of bile. On November 16th the abdomen again became markedly distended and the general condition of the baby became much worse. On November 17th the abdomen was tapped and



considerable bile-stained fluid was obtained. The baby died on the evening of November 17th.

*Clinical Diagnosis.*—In considering the diagnosis during this patient's stay in the hospital, the various causes of icterus in young infants were considered. It was obviously not a case of icterus neonatorum on account of the late development of the jaundice, its severity, and the absence of bile in the stools. The other common causes of jaundice in young infants are infectious disease of the newborn, congenital obliteration of the bile-ducts, and occasionally catarrhal jaundice. This case failed to present the other evidences of infectious disease of the newborn, such as septic fever, marked prostration, and hemorrhages. It is true that according to the history in the period from October 20th to October 25th, the baby was feverish, but he showed no evidence of a severe infection. Catarrhal jaundice is very rare in young infants, and does not account for the ascites which was found in this case.

In the reported cases in which congenital obliteration of the bile ducts has been found at autopsy, the jaundice usually develops within a day or two after birth. In this case it developed somewhat later, but as no bile was found in the intestinal discharges, it was considered that there was probably an obliteration of the bile-ducts which might have become complete at some period subsequent to the child's birth.

*Autopsy.*—Permission was obtained for partial autopsy only through the abdominal incision. The following is a transcription of the autopsy record:—

"Body is that of a rather poorly nourished male infant. There is no rigor mortis; slight post-mortem lividity. The skin everywhere shows an intense jaundice, being of a deep greenish-yellow color. The abdomen shows an open incision in the right upper quadrant with a gauze drain leading to the gall-bladder. Autopsy was performed through this incision, only the liver, the kidneys, the spleen, the stomach, and a portion of the duodenum being removed.

"*Peritoneal Cavity.*—A gauze drain was adherent to the intestines which appeared to be collapsed below this point.

"*Liver.*—The liver with its round ligament and the umbilicus, and a portion of the stomach and duodenum were removed *en masse*. The umbilicus and the round ligament appeared normal. The surface of the liver showed a dark greenish-yellow appearance. Some bile exuded from the capillary bile-ducts. The gall-bladder was open. There was no obstruction in either the common bile-duct, or the hepatic duct. A probe could be easily passed from the biliary papilla in the duodenum through the common and cystic ducts as far as the gall-bladder, and through the hepatic duct as far as the liver substance.

*"Stomach and Duodenum.*—These organs showed nothing remarkable except the bile staining seen in all the tissues.

*"Spleen.*—The spleen was rather large and of softer consistency than normal. The cut surface was of a deep purplish color. The trabeculæ were not present. Considerable pulp came away on scraping.

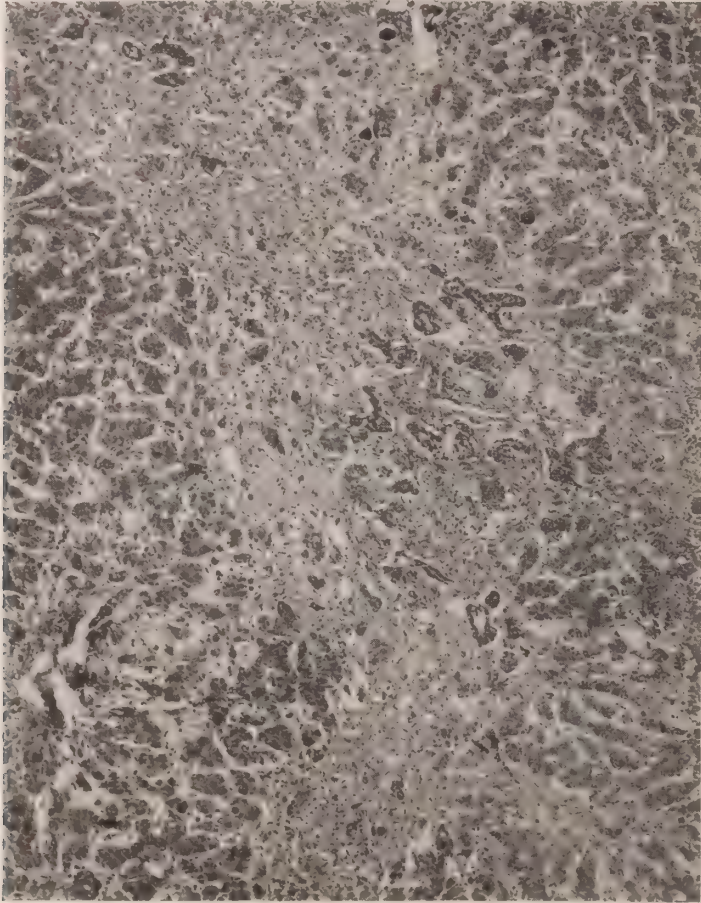
*"Kidneys.*—The kidneys were markedly congested. The cortex appears somewhat wider than normal. Here and there in the cortex were radial areas extending to the surface and resembling infarctions.

*"Microscopic Examination.*—(1) *Spleen.*—The Malpighian bodies are not apparent. The reticulum is poor in lymphocytes. There are many endothelial and many phagocytic cells. There are some plasma cells; some areas containing only large phagocytic and endothelial leucocytes and blood. There are numerous polynuclear leucocytes.

*"(2) Kidney.*—In the cortex there are wedge-shaped areas where the normal markings of the kidney have completely disappeared. These areas are filled with polynuclear leucocytes. The blood-vessels of the kidney are everywhere markedly distended with blood. Many of the straight tubules are filled with exudate consisting chiefly of polynuclear leucocytes, with some fibrin and some endothelial leucocytes. Some of the glomeruli show a light increase in the cells of the capsule. Some of the convoluted tubules show in their lumen desquamated cells, polynuclear and endothelial leucocytes, and their epithelium is swollen and degenerated."

*Liver.*—The following report on the liver was received from Dr. Councilman:—"There are essentially two conditions in the liver, one a very diffuse increase in connective-tissue, not in very large amounts, but extending between the lobules, into the lobules, and even about the central veins. In places there are numbers of cells and polynuclear leucocytes in this. The second condition is very marked degeneration in the liver cells. This takes the form in places of actual necrosis; other cells show a heaping of nuclei in the cells, the nuclei resulting from direct division, and in places the cells seem to be undergoing an actual liquefaction, as though some histolytic agent were present. The bile-ducts in the portal spaces are increased in number, are dilated, but do not contain bile pigment. There seems to be little or no bile pigment in the liver cells, the capillary bile-ducts are in places somewhat dilated, but there are no bile casts in these. In the capillaries there are the usual number of cells of the myelocyte series, compatible with few weeks age. It is difficult to say anything concerning the nature of the process; it does not seem to me probable that such a condition could have arisen during the few weeks post partum. It is not impossible that it is a congenital condition, the action of a

toxin of some sort. It is not entirely incompatible with syphilis, but there were no other evidences of syphilis at the autopsy. Of course, cases of cirrhosis at a very early age are not unknown. I have a liver of, I think, five weeks, with well-marked cirrhosis which might have been preceded by much this condition. The degeneration in the liver cells I regard as the primary condition and the connective-tissue increase as secondary to this."



Low power view of the cirrhotic liver.

In this case the clinical diagnosis was congenital obliteration of the bile-ducts, while the autopsy revealed a condition of congenital cirrhosis of the liver without obliteration of the bile-ducts. These two conditions are described by many writers as separate diseases, although their clinical manifestations are practically identical.



## PATHOLOGICAL ANATOMY.

In the majority of the reported cases, there is found at autopsy complete obliteration of some part of the extrahepatic bile-ducts. In the majority of cases the common duct is obliterated, usually down to and including the opening of the papilla of Vater. The obliteration usually also involves the hepatic ducts. The cystic duct may be obliterated, or its lumen be much narrowed. The obliterated ducts are usually represented by a fibrous cord, but may be entirely absent. The gall-bladder is frequently very small, and is sometimes also obliterated, and replaced by fibrous tissue.

Accompanying this condition of obliteration of the bile-ducts, there are always found marked changes in the liver. The principal lesion is a cirrhosis, of the biliary type, characterized by an increase in connective-tissue, which is most marked in the region of the portal vessels, but which often occurs to a varying extent diffusely within the lobules. The connective-tissue varies in age, in some cases appearing comparatively newly formed, in other cases old and dense. The changes in the liver cells show marked variations in different cases. In some cases the cells remain arranged in orderly trabeculæ; in others some of them are much increased in size; in still others they show marked atrophy or extensive destruction. The bile capillaries are usually much distended and many contain inspissated bile. There are often newly formed bile capillaries to be seen.

Two views are held as to the pathogenesis of the cases in which obliteration of the bile-ducts is found. One view regards this lesion as developmental in origin, a congenital malformation. The other view regards the lesion as due to an inflammatory process, leading to fibrous tissue formation and obliteration. It is possible that in some instances the condition may represent a congenital malformation, but such instances are certainly extremely rare. It is probable that in the majority of cases the obliteration of the ducts is due to inflammation.

Two views are also held as to the relation of the cirrhotic process in the liver to the obliteration of the bile-ducts. One view regards the bile-duct process, whether inflammatory or developmental, as primary, and considers the cirrhosis of the liver as a secondary process. The other view regards the process in the liver, cholangitis and cirrhosis, as primary, and considers that the occlusion of the bile-ducts is due to an extension of this tissue reaction down along the large bile-ducts. In favor of this latter view is the fact that obliteration of the extrahepatic bile-ducts is never found without an accompanying cirrhosis of the liver, but on the other hand many cases have been reported in which precisely the same cirrhosis was found in the liver, but in which the common

and hepatic ducts were found patulous throughout their entire extent. The case reported above is of this type. While the changes in the liver do not resemble those generally described as occurring after sudden obstruction to the flow of bile, it is usually difficult to tell which process is primary. There is anatomical evidence on either side, and it is quite possible that either lesion may be the primary one.

The two conditions are certainly so closely connected that they cannot well be considered as distinct diseases.

#### ETIOLOGY.

The cause of the condition is unknown, and very possibly varies with the case. Congenital syphilis is probably not an etiological factor. If we exclude those cases, certainly rare, in which the obliteration of the bile-ducts may represent a congenital malformation, the prevailing view is that the inflammatory process is due to the absorption of toxic substances from the mother, and this theory is unaffected by the question as to whether the liver or the bile-ducts are first affected. This theory is, of course, without proof.

#### SYMPTOMS.

The most striking symptom is jaundice, which is sometimes present at birth, but which usually develops on the second or third day, and sometimes not until the fourth day. The development of the jaundice as late as the twelfth day in the above case must be regarded as exceptional. The late appearance of the jaundice might be regarded as evidence that the lesion producing it was not congenital, but was due to some cause acting after birth, were it not for the fact that the changes in the liver were of so marked a character that they must have been older than twelve days. In cases in which there is hepatic cirrhosis without obliteration of the larger ducts, the jaundice may appear later.

The jaundice increases rapidly, and soon becomes intense, so that the skin appears of a greenish-yellow tint. The stools may or may not be composed of meconium at birth, according to the period of fetal development when the obstruction occurred. Meconium is usually seen, but very soon the dejecta becomes white or clay colored. In the majority of cases, bile pigment is not to be demonstrated in the stools by chemical test.

The urine is always dark, and contains bile. The liver and spleen are usually enlarged, although not always, especially in cases where cirrhosis of the liver is very marked. Hemorrhages may be seen in the early days of life, or late in the course of the disease.

The babies lose steadily in weight and strength. Symptoms of indigestion may be present, but are usually notably less marked than one would expect. In fact, the general condition, for quite

a time after the development of the symptoms, remains much better than would be expected in a condition with such serious lesions. Finally, however, malnutrition becomes extreme, and death occurs from inanition, or from some intercurrent infection.

#### DIAGNOSIS.

Icterus neonatorum is easily excluded in these cases on account of its mild and brief type of jaundice, and the fact that the stools and urine remain normal. The conditions to be particularly considered in diagnosis are infectious disease of the newborn with jaundice as a symptom, and catarrhal jaundice. When jaundice is a symptom of infection, the temperature is usually elevated, and not infrequently high and irregular. The general condition is usually more profoundly affected from the start. The physical examination frequently gives definite information as to the source and location of the septic process. The jaundice is often not quite so intense. The most important point, however, is that the movements in sepsis are not light colored, and contain bile.

It is more difficult to exclude catarrhal jaundice, although this condition is extremely rare in the early days of life. Catarrhal jaundice may show the same intense icterus, with absence of bile in the stools. Even when it is seen early in life, it usually develops at a somewhat later period after birth. In such a case, with comparatively late development, and with absence of enlargement of the liver, catarrhal jaundice may be suspected. The diagnosis can be confirmed only by the favorable course of the disease.

#### PROGNOSIS.

The prognosis of congenital cirrhosis and obliteration of the bile-ducts is bad. Some cases die in the early weeks; others may survive for several months. Eight months is the longest recorded period of survival.

#### TREATMENT.

Careful feeding is the only treatment which can be employed in these cases. Milk modifications in artificially fed infants should be low in fat, high in protein.

In cases in which the diagnosis is fully established by the persistence of signs of complete obstruction to the flow of bile, I believe that a surgical exploration should be considered. Such an operation will probably shorten the life of the baby, if the diagnosis is correct. On the other hand, there is a possibility of the jaundice being due to some remediable condition, such as mechanical obstruction of the large ducts from pressure of glands, inspissated bile, or peritoneal adhesions. The absolutely hopeless prognosis makes it



justifiable to take advantage of the possibility, even though remote, of a mistake in diagnosis.

#### PROBLEMS AND RESEARCH.

The problems of the cause of the tissue changes, whether they are due to a malformation, or to the intra-uterine absorption of toxin from the mother, and of the location of the primary lesions, are not very promising for experimental investigation. Possibly the continued study of pathological material together with thorough and continued observations on the presence of bile in the duodenum or stools throughout the life of the baby, may eventually give more light. The method of studying the contents of the duodenum by means of the duodenal catheter, as described and practised by Hess, is particularly worthy of mention in this connection. Hess has further called attention to the rôle of the pancreas in this disease. He finds that the pancreatic duct of Wirsung is frequently obliterated at its opening, when the common bile-duct obliteration involves the papilla of Vater, but that the pancreatic ferments may nevertheless be found undiminished in the contents of the duodenum obtained by the duodenal catheter. In these cases the obliteration of the duct of Wirsung is compensated by the presence of the accessory duct of Santorini, and the prognosis as to duration of life is probably better than in cases in which no accessory pancreatic duct exists.

## ANOTHER VIEW ON VENTILATION.

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The broad facts which suggest the noxious properties of re-breathed air must have been known from the earliest times.

Scientific men formulated reasons for them before the constitution of the atmosphere had been discovered. With successive advances in physical and biological knowledge, the point of view as to the vital properties of air has shifted. The story of ventilation not only unfolds the progress of 'natural philosophy,' but it reveals the psychology of the investigator and gives in epitome the errors of the working mind. Less than a century ago the consumption of oxygen and the accumulation of carbon dioxide in respiration were supposed to account sufficiently for the vital deterioration in re-breathed air. Then, by a series of experiments, which seemed at the time irrefragible, it was apparently demonstrated that specific, volatile, organic poisons were added by the living body to the air expired, and it was held that the noxious properties of rebreathed air were due to them. Not very long ago every lecturer on physiology taught that the respirability of air containing a given high percentage of  $\text{CO}_2$  was on very different planes, according as the gas was introduced artificially or by breathing in a confined space. Thereafter the  $\text{CO}_2$  content of air in occupied rooms was used as a measure of its purity because it served as an index of organic contamination. The problem was regarded purely as a chemical one, and its interest for the investigator lay in the identification of the noxious element in the exhalations. Scientific reflection and experiment gradually shook the foundations of the chemical theory of ventilation and introduced the conception that under none of the ordinary associations of life do the chemical changes induced in the air by respiration have any material physiological influence.

According to this view, which has had the overwhelming support of investigators for the past two decades, the unfavorable effects of 'bad air' in ill-ventilated spaces is due solely to the combined physical factors, high temperature and humidity, which interfere with normal radiation from the person and thus lead to a rise of body temperature. It is obvious that such an interference with the fundamental function of heat regulation may be supposed to involve in its wake profound metabolic and psychic dyscrasias.

The writer recently witnessed a startling demonstration of the potency of even a mild degree of over-heating. He had placed half

a dozen guinea-pigs in a box under the cover of the receptacle at the back of an automobile. The conditions of ventilation were quite similar to those realized without ill effects to guinea-pigs on many previous occasions. But the occurrence in question was on a warm day in October. The motor car stood in the sun for an hour or more before the box with the guinea-pigs was removed. The air in the chamber was perceptibly but not excessively warm. Nevertheless every animal was on its side, prostrated, with failing respiration; one died immediately, and the others, after more or less restoration, in the course of two hours. One had unwittingly established a veritable "Black Hole of Calcutta."

A review of even the limited literature quoted in this article seems to prove beyond question that the properties of bad air which make necessary the art of ventilation consist *primarily* of combined heat and humidity, and, possibly, lack of movement.

But a little reflection warns us that this mechanical conception as a basis of ventilation may lead to errors more serious than the abandoned chemical view. It may well be urged against the conclusions drawn from the later work that the experiments on which they were founded covered far too brief a period to represent reactions of life-long duration; accordingly, to achieve recognizable results, the variations from the normal environment were necessarily more extreme than is ever witnessed under ordinary conditions.

Again, as pointed out in another place,<sup>1</sup> the predominant vital effect of warm, humid air in a closed space is a psychological one, a source of discomfort which calls insistently for relief.

The ebb and flow in the sense of well-being experienced by the occupants of a tightly closed chamber,<sup>2</sup> according as the air is allowed to stagnate or is stirred to motion by a revolving fan, simply represents the dominance of sensation in our consciousness; it gives no proof that deleterious agents may not be present in the re-breathed air. On the contrary, it is quite possible that the physiological reaction producing the most intolerable discomfort is self-protecting against the external noxa which under the comfort induced by the fan finds unresisted advent into the tissues. That is, from a teleological point of view, the discomfort and concomitant physiological disturbances experimentally induced in close air may really be, perhaps after the manner of fever and inflammation as reactions to infection, beneficent in their ultimate status. Lee<sup>3</sup> reports incompleting experiments in which cats were confined in small chambers, and while all of them were supplied with abundant fresh air, the space in some of the chambers was kept approximately at a temperature of 69.8° F., relative humidity 54 per cent. In others the temperature was raised to 91.4° F. and humidity to over 89 per cent. In the animals under the latter conditions there was



an average rise of nearly  $1^{\circ}$  F. in the body temperature. Various groups of muscles isolated from the animals showed, under artificial stimulation, a loss of total work power of 14 to 26 per cent., and there was a diminution of 13 per cent. in the sugar content of the blood.

It is therefore fair to assume that the feeling of discomfort brought on by sudden rise in temperature and humidity of the air is attended by or caused by widespread physiological changes.

These results somewhat suggest the observations of Zuntz and his colleagues on the high Alps.<sup>4</sup> They found that the machine efficiency of the body depended greatly on the state of physical training. Destructive metabolism, fatigue, and functioning excess were much greater for the same amount of work done in untrained than in trained subjects. The analogy between the two sets of observations suggests that the psychic and metabolic results produced by sudden confinement in warm, moist air might be completely averted by a course of gradual exposure to like conditions.

In the most recent investigation on this subject,<sup>5</sup> the New York State Commission on Ventilation has carried on a prolonged series of experiments in which the ventilation conditions were exactly controlled, but were modified so gradually as to produce no acute reaction on the part of the subjects. The experimental environment therefore imitated much more closely that habitually found under ordinary conditions of defective ventilation than has been usual in observations of this sort. A total of ninety-three young men were the subjects of experiment, usually in groups of four, in specially constructed rooms. The subjects remained in the observation rooms from three and a half to eight hours a day, sometimes for periods of six weeks. Regard was paid to the effect of temperature and humidity and of "carbon dioxide, organic matter and other chemical constituents of stagnant air upon physical and mental condition and efficiency." These valuable experiments have been rewarded with no dramatic results. The Commission reports: "The power to do either mental or physical work, measured by the quantity and quality of the product by subjects doing their utmost, is not at all diminished by a room temperature of  $86^{\circ}$  with 80 per cent. relative humidity. On the other hand, the inclination to do physical work and the inclination to do mental work are diminished by sufficiently high room temperature. . . . Stagnant air at the same temperature as fresh air, even when it contained twenty or more parts of carbon dioxide and all the organic and other substances in the breathed air of occupied rooms, has, so far, shown no effect on any of the physiological responses . . . nor on the power or inclination to do physical or mental work, nor on the sensation of comfort of the subjects breathing it. On the other

hand, the appetite for food of subjects exposed to such stagnant air may be slightly reduced."

Two members of the Commission, in a further report<sup>6</sup> of observations made upon various squads of young men and young women, conclude that there are substances present in the air of an un-ventilated occupied room (even when its temperature and humidity are controlled) which in some way, and without producing conscious discomfort or detectable physiological symptoms, diminish the appetite for food.

The general outcome of these prolonged observations, in which the factor of training to the experimental conditions seems to have been involved, was much less striking than that which other investigators, working through short intervals and under more distinctly abnormal conditions, have been accustomed to report.

The salient results of the Commission's work consist in a demonstration of a diminution of *inclination* to do mental or physical work in air at a high temperature, and in a lessening of appetite for food, which is ascribed to rebreathing the chemical products of respiration. These are, however, fundamental attributes. The inclination to work is a measure of vital energy and initiative. Appetite for food automatically regulates the caloric supply to the metabolic requirements of the body; it stands for the individual as preëminent as does the sexual instinct for the race.

Considering both reports which have been quoted, we find that the Commission on Ventilation includes both the physical and chemical characters of rebreathed air under hygienic indictment.

To recapitulate briefly, the present status of the ventilation question is founded upon a blending of past beliefs and current demonstrations. Practically all the old evidence for a chemical noxiousness in respired air has been riddled by the critical tests of exact experiment. For more than a decade the more mechanical view has prevailed that all the deleterious effects of rebreathed air depend simply upon the physiological reactions to the incidental increase in heat and humidity of occupied apartments. It has been pointed out that, while the feeling of discomfort in ill-ventilated rooms may demonstrably depend upon a mere combination of elevated temperature with excessive humidity, no proof whatever had been afforded that these physical conditions determine the real noxiousness of stagnant air. In fact, as may be inferred from the work of the New York Commission, the sensory reactions, which are so prominent when heat and moisture are suddenly increased in an apartment, fall away when the change in environment is more gradual and continued, although it is evident that any deleterious quality in the exhaled air must be cumulative in its effects.

Immunological experiments performed on guinea-pigs more than two years ago impressed upon me the suspicion that the biological

relations of ventilation are vastly more complex than has hitherto been admitted.<sup>7</sup> In the investigation referred to, guinea-pigs were sensitized to horse-serum by subcutaneous injection. It was expected that some definite response would be elicited by dropping horse-serum into the nose, but the results were negative unless the instillation was repeated after an interval of about eight days. Then it was surmised that, possibly, the effluvia from horses might produce some recognizable response when inhaled by sensitized pigs. Accordingly, serum-sensitized guinea-pigs, with normal controls, were exposed in a livery stable during the hot weather in July when the air of the place was pungent with the characteristic stable odor. Within about five to fifteen minutes certain of the sensitized pigs showed signs of excitement which could not but attract attention. The animals for the most part remained in the stable over night, and within an hour or two of their removal next day were given an intravenous injection of horse-serum. The pigs which had reacted in the stable were not affected by the injection; the others died in anaphylactic shock. The refractory animals had been made 'anti-anaphylactic' by breathing the stable air; the refractory condition, however, was but temporary, sensitivity returning in the course of forty-eight hours or less.

Certain sensitized pigs showed no undue excitement when brought into the stable, but after a sojourn there of some days they, too, frequently resisted the deadly toxic injection. The acuteness of the anaphylactic disturbance in the stable seemed to be limited to periods when the odor of the place was most intense. That the sense of smell was concerned in the setting up of anti-anaphylaxis seemed to be indicated by the fact that sensitized pigs which had suffered section of the olfactory nerves or loss of olfactory lobes for the most part retained their sensitivity. But that the sense of smell, if operative at all, is not the origin of the anti-anaphylaxis is proved by the fact that one animal from which the olfactory lobes had been removed became refractory to the toxic injection.

The experience related is of the same order as is so frequently witnessed in the setting up of a paroxysm of hay fever or asthma in an atmosphere charged with certain antigens. The temporary desensitization of the serum-sensitized guinea-pig by breathing the air of the horse stable having been accomplished, it was attempted in a limited number of experiments to achieve the reverse of this, and to sensitize the animals to horse-serum under the same conditions. My results were negative, but Rosenau reports successful sensitization under somewhat similar conditions.

It is a fair inference from the facts that have been detailed, that whenever an animal has been sensitized to a certain antigen, the presence, in the air breathed, of volatile matters, which need not be the antigen itself but are related to it in origin, may produce



profound biological effects. As witnessed in my stable experiments, these effects may be achieved without excitation of obvious symptoms. The so-called anaphylactic reactions of asthma, etc., are commonly regarded as exceptional and pathological events, but we must suspect a qualitatively similar, if quantitatively different, biological response whenever the sensitized being breathes air containing the appropriate excitant.

For 'animal' read 'man,' and we can imagine how the wellnigh universal infection with tuberculosis sensitizes the body not only to tuberculin, but possibly to certain exhalations found in rebreathed air. The range of bacterial life to which the average man is sensitized is far from being known, but the antibodies to a surprising number of pathogenic organisms have been found in human blood serum. Such persons are probably specifically susceptible to the appropriate antigens brought in contact with the respiratory epithelium.

#### SUMMARY.

The present paper does not aim to present a new theory of ventilation, but rather to issue a caveat against too narrow a view of its principles. The experiments, from Brown-Séguard to Rosenau, which seemed to demonstrate poisonous properties in the exhalations from the lungs, have been shown to be either faulty in technique or capable of diverse interpretations. Physiological observations on the increase of heat and humidity in close or confined spaces sufficiently prove that the sensory disturbances associated with sojourn in close air can plausibly be ascribed to these physical agencies, probably through their effect in preventing loss of heat to the body, with associated rise of temperature and perversion of metabolism. Nevertheless, nothing could be more dangerous than content in the belief that the only factors to be controlled in ventilation are the heat and humidity of the air.

It has been demonstrated that guinea-pigs sensitized to horse-serum profoundly react to the respiration of exhalations from horses.

It cannot be doubted that normal beings also absorb organic effluvia from rebreathed air. We are deeply ignorant as to the effect on the body of such incorporations. If an analogy may be drawn with the results of recent, unpublished, experiments obtained by Cuthbert Powell and myself, we must surmise that the effect upon the body of inspired protein is qualitatively determined by the amount absorbed.

In the present essay it has been suggested that in certain pathologic conditions the exhalations contain substances which may act as specific stimuli, as, for instance, the exhalations from a consumptive might specifically affect one who is tuberculous-sensitive.

Enormous complexity is added to the conception of ventilation by thus individualizing its conditions. The experienced experimenter will also realize the difficulty of obtaining crucial results when the reactions of his subjects may be modified by the breath from his own lungs. It behooves him to tread lightly and speak softly when he enters the ventilation-chamber.

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FACTS TO BE ASSOCIATED WITH INJURIES AFFECTING  
THE KIDNEYS.

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The comparative frequency of injuries to the kidneys make the topic one of considerable interest to the general surgeon as well as to the genito-urinary specialist, and it is from the standpoint of the former rather than the latter that the subject will be presented. It frequently occurs that the family physician is first called at the time of the accident and upon him must rest the primary diagnosis. It is, therefore, very important that he also should be conversant with the symptoms which usually follow such a lesion in order to give the patient the benefit of proper surgical attention as early as possible.

It is surprising how slight the trauma may be which will give rise to kidney injury. This is especially remarkable when we consider its location deep in the posterior aspect of the abdomen, the right kidney resting on the twelfth rib close to the vertebral column, the left usually on the eleventh and twelfth ribs, the pleura above extending down to the twelfth rib. The hilum of the kidney, with the blood-vessels above and the pelvis of the ureter below, lies on the level of the twelfth dorsal vertebra. Injuries to the right kidney occur more frequently than those to the left, due to the fact that it is situated lower in the lumbar region. They are much more common in males than in females because of the more active life led by the former. The very fact that the kidney is placed close to the vertebral column makes the resultant destruction of renal tissue the more complete in case of accident, the bony wall at its posterior aspect accentuating the force of the injury. A rupture of the kidney sometimes occurs from force applied at a considerable distance from the organ, on the same general principle as that extant in fractures of the skull with laceration of the tissues of the brain at a point quite remote from the actual trauma to the bone. Experimentally it has been proved that whether the pelvis is filled with fluid or not at the time of the injury has a great deal to do with the severity of the lesion. Kuester has made some very interesting experiments to prove this: (1) Taking a kidney from a recently killed animal and dropping it from a height, he found a simple contusion of the cortex; (2) taking another kidney and distending the pelvis with fluid, tying off the vessels and ureter, and dropping the organ in this distended condi-



tion from a similar height, the result was a very much more severe laceration.

The kidney is fortunately extraperitoneal; thus the resulting trauma from various falls and bruises does not as a rule result in general peritonitis. The introduction of urine even into the peritoneal cavity does not cause general peritonitis provided this is a very gradual one or occurs at intervals in small amounts. If, however, the flow is constant and in large amounts, the result is peritoneal infection. The type of injuries which may occur varies with the severity of the inciting causes. These injuries may be subdivided as a matter of convenience into (1) those which involve simply the fatty or fibrous capsule without injuries to the parenchyma, though there may be small hemorrhages beneath the capsule; (2) those in which the capsule is torn and there is a contusion of the parenchyma without an actual tear of the renal tissue; (3) where in addition to the tear of the capsule there is actual involvement of the parenchyma (this may consist of numerous radiating tears or small lacerated wounds); (4) tears of the parenchyma which involve the renal pelvis (this usually means eventually a urinary fistula); (5) complete laceration of the kidney with its division into two or more parts; (6) while the actual lesion to the parenchyma is not so great there is a tear of the ureter or of the renal vessels.

Regarding the usual symptoms following kidney trauma, it has been estimated that in 40 per cent. of the subcutaneous injuries affecting the viscera, the kidney is the one affected. In 80 per cent. of these cases hematuria is a prominent symptom. It is unquestionably the most important symptom and one which should be looked for in every case involving contusions of the lumbar regions. This hematuria may be slight or it may even be absent. If only the capsule is torn and there is no injury to the parenchyma, blood will not appear in the urine. It must be remembered, however, that blood will not appear in some very severe injuries where the ureter is torn across, especially if this tear is complete. The shock following injuries to the kidney is usually severe, and yet in some instances patients with severe wounds of renal tissue have walked to their homes or even continued with their vocations until weakness from loss of blood forced their retirement to their beds. In some cases there is simply a transient hemorrhage, the patient recovering in a few days. Where the kidney is badly lacerated the danger of immediate death from hemorrhage is, however, great. This is also true where the renal vein or artery is torn. It should be remembered that the passage of a blood clot through the ureter from the pelvis may cause the patient to have a most acute attack of pain a number of days after the accident; also that blood may appear in the urine after even such slight manipulation as renal

palpation. The possibility of a traumatic nephritis, too, should be considered after injury to the kidney.

In case there is a tear of the peritoneum, the blood will flow directly into this cavity and the resulting dulness on palpation will be the persistent symptom.

Anuria or oliguria is a consequence which may follow kidney trauma. Even when the other kidney is present and normal, there occurs in some instances a sympathetic decrease in its secretion which at times is nearly complete.

Sepsis is another very important sequence. The escape of urine into the surrounding tissues always presents serious complications. A certain amount can be borne, but in case fermentation occurs, the outlook is always very much more complicated, the tendency being for the tissues to become necrotic and a large abscess cavity to form in the perirenal region; this may extend nearly to the middle line anteriorly and to the anterior superior spine below. There is a gradual absorption of toxic products into the system, which if not relieved by early drainage will cause the death of the patient. In case the tear has extended to the calyces or into the pelvis of the kidney, there is always the possibility of a urinary fistula forming as a result of the leakage of urine. The usual discharge from such an abscess is pus mixed with urine. The accumulation occurs in case the sinus closes temporarily; and the patients become very much emaciated and very septic until effective drainage is again secured. As a rule, incisions of the perirenal abscess and the insertion of drains are about all that can be done at such a time, though it becomes absolutely necessary occasionally to remove the remnants of the kidney. This is frequently badly lacerated, very adherent, and its parenchyma may be riddled with abscess cavities. In case the peritoneum is torn so that there is a discharge of this gangrenous material or pus into the peritoneal cavity, a septic peritonitis speedily develops and the death of the patient follows. This is a danger to be carefully avoided. Nephrectomy, at any time a serious operation, becomes doubly so when complicated with the extravasation of urine and a large pus cavity. Certain anatomical and pathological conditions must be considered. Primarily you always have to face the possibility of only one kidney being present. It should be borne in mind that the renal artery is longer and the vein shorter on the right than on the left. The shortness of the vein requires particularly careful manipulation in the removal of the right kidney, owing to danger of tearing the vena cava. The vein is so short that the vena cava borders the renal pelvis. Injury to the vena cava has repeatedly occurred in the removal of the right kidney. An interesting point mentioned by Ransohoff is that the left renal vein is joined by the spermatic vein of the

same side. A sudden onset of varicocele at an age when the disease is uncommon, calls for an examination of the kidney.

In considering the removal of a kidney for any pathological condition, the following abnormalities must also be borne in mind:—

1. *The Fetal Type*.—At about the tenth week of development the surface of the kidney becomes marked by shallow depressions into lobes, of which there are about eighteen. This lobulation in the course of normal development persists until birth, when it gradually disappears. When the adult kidney presents lobulation on exposure, its surgical significance is unimportant.

2. *The Cystic Kidney*.—The tubules of the kidney are formed by the union of two distinct structures. It is possible that in certain cases there may be failure of this union. The secreting portions of these tubules would, however, become functional, yet there would be no way of escape for the secretion, owing to the fact that they were isolated so far as their connection with the pelvis of the kidney was concerned. This may account for certain large tumors of gradual growth, which starting in at an early period may increase in size until they fill the entire lumbar region on one side of the abdomen.

3. *The Horseshoe Kidney*.—Occasionally the upper poles of the kidney fuse across the middle line, the result being the formation of a single or horseshoe kidney, the two sides being connected by the transverse bar. Robinson states that the isthmus is above only in 7 per cent.

4. Congenital absence of one kidney is fortunately very rare. Morris reports one in 2,500 cases. The following case reported by Barnett illustrates the possibility in regard to this. The points briefly recited are these:—

Patient complained of pain in left side, nausea and weakness. Cystoscopy showed mild cystitis; ureteral openings normal. Catheter up left ureter gives cloudy purulent material. Catheter stopped at 6 inches. Catheter up right ureter 9½ inches. Easily passed clear urine. X-ray showed stones in left kidney pelvis, with kidney displaced low down in the pelvis. Right side negative. A leaded catheter was not passed into the ureters before the x-ray picture was taken.

*Operation*.—Kidney delivered, found bipolar. The bifurcated ureter was traced from the upper half of the kidney pelvis leading down and joining bifurcation of the left lower ureter. Palpation of the right lumbar region through an enlarged incision revealed an apparently normal kidney which was proved at autopsy to be an extra lobe of the liver. Patient died in six days, of uremia. No right kidney found at autopsy.

Here is a case which vividly reveals the danger of removing a kidney. Apparently every precaution had been taken. The ureters had been catheterized, and the character of the secretion from each kidney carefully scrutinized. An x-ray had been taken. Unfortunately the most important point of all had not been attended to,



that is the passage of leaded ureteral catheters and then the taking of an x-ray which would have shown that both catheters were passing toward one side. This kidney at autopsy presented a single pelvis from which the two ureters descended to the bladder.

Before removing a kidney, the following steps should be taken, whenever possible:—

1. The catheterizing of the ureters.
2. The examination of the character of the urine from each ureter.
3. The passage of leaded catheters and the taking of the radiograph.
4. The phenolsulphonephthalein test, generally called the functional test.

A few words about this test which should be more generally used. Let me emphasize first that it is simply supplementary to the regular examination of the urine which should never be neglected. It can be applied without necessarily catheterizing the ureters; in this case, of course, you do not secure the functional results from a single kidney, but from both. Just as taking the blood-pressure gives you a good general idea of the circulation, so this test tells you whether both kidneys are functioning properly. At the present time it is being used also before surgical operations, in the same way as any other examination of urine. Not only is it used in operations on the kidney, for here you need catheterization of the ureters and this, of course, needs the services of an expert in any but the most simple cases, but in any serious operation it shows you whether your kidneys are secreting 10 per cent. of the normal, or 90 per cent. Knowing this you are in a much better position to give a favorable or an unfavorable prognosis. The test itself is exceedingly simple. About 1 c.cm. of phenolsulphonephthalein is injected into the buttocks hypodermically, as you would inject any other fluid preferably into the muscles. The bladder having first been carefully emptied, a catheter is passed into it. Note first when the urine coming from the bladder shows the slightest trace of scarlet in a 10 per cent. sodium hydrate solution. Normally, this color should appear in from five to ten minutes at the outside. When fifteen or twenty minutes is taken, it means that the function is subnormal. The urine coming is then collected for the first hour in a beaker, its color carefully noted and compared with the normal scale of excretion of this particular dye, which is 30-50 per cent. In another beaker collect the urine for the second hour; 15 to 30 per cent. of the dye should be returned in the second specimen. Then take the two specimens, mix them, compare the color with that of your color scale and you get the average. The color scale is prepared by taking one ampoule of the dye, and adding it to one litre of water. Diluting this one-half gives you 50 per cent.; three-

quarters 25 per cent.; one-quarter 75 per cent. These colors can be conveniently placed in test-tubes, corked and kept in the laboratory at the hospital. Most of the collecting can be done by the orderly or nurse. The reading of the scale is done by the examiner when he makes a subsequent call.

It is undoubtedly true that this comparatively simple method which I have reviewed very briefly will, in the future, be much more generally used, and it is with the idea of increasing its use that I have taken the liberty of calling attention to its simplicity. Let me make this statement, however: Recent reports should be mentioned which state that some observers securing a large functional percentage from this test have operated on patients, and then have had these same patients die from uremia after the operation. The reason for this, which at present is being developed, is possibly that ether anesthesia, owing to its irritative action on the kidneys, may have been the inciting cause, creating an acute condition where previous to its administration simply a quiescent lesion of the kidney parenchyma existed. It was with this fact in mind that I previously made the statement emphasizing the importance of the regular routine microscopical examination as supplementary to this test.

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## OBSERVATIONS ON THE BLADDER IN DISEASES OF THE CENTRAL NERVOUS SYSTEM. REPORT OF FIFTY CASES.

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In this brief report we purpose to review some of the important findings in the bladder in diseases of the central nervous system, and possibly to add a few ideas which may be novel on this subject.

It has long been known that the internal vesical sphincter loses its tonicity comparatively early in some diseases affecting the brain and spinal cord, for example such diseases as tabes dorsalis and dementia paralytica. The same vesical condition has been demonstrated in this series of cases in the following conditions:—

1. Tabes dorsalis.
2. Dementia paralytica.
3. Post-apoplectic conditions.
4. Tumors of the spinal cord.
5. Exophthalmic goitre.
6. Paralysis agitans.
7. Continuous retention catheter.
8. Lead poisoning.
9. Gumma of spinal cord.

Lues has always been considered of prime etiological importance, and many of these cases either have a positive Wassermann or give a definite history of an ancient infection. In the post-apoplectic cases—spinal cord tumors, exophthalmic goitre and paralysis agitans—lues was shown to play no rôle in the causation.

*Sex and Race.*—Of interest is the occurrence of this bladder picture, to be described, in a female and in 3 negroes having disease of the central nervous system. The long continued wearing of a catheter for drainage of residual urine in a case of prostatic hypertrophy led in the end to the bladder neck picture which closely simulated the so-called tabetic orifice. The orifice picture which was associated with exophthalmic goitre occurred in a young boy, sixteen years of age, who came to the clinic complaining of enuresis. Local treatment corrected his symptoms, but his orifice still remains the same. We have observed the so-called tabetic orifice in quite a number of individuals in the clinic being treated for chronic prostatitis and seminal vesiculitis. Such patients have been relieved of their symptoms by the ordinary standard measures for



treating such inflammatory lesions. Thorough neurological examinations failed to reveal any abnormalities, and we are interested in watching their outcome. At present we are not prepared to say whether such an orifice picture is always indicative of cerebro-spinal disease. In 2 cases that we have followed for some time, that were neurologically pronounced clear, and in whom we had found this orifice picture, there later developed neurological indications of spinal cord tumor, which were confirmed—one by operation; one by autopsy. This makes us inclined to believe that an individual with such an orifice should be carefully watched.

Examination of these cases gives the following interesting findings:—

*Inspection.*—(a) External genitalia. The genitals as a rule have a flabby atonic appearance, often accompanied with varicocele.

(b) Urination. If one watches the act of urination in most of these cases, one will immediately observe the hesitancy in the beginning, and the slowness and lack of force of the stream during the act, with dribbling at the end and frequently a continuous paradoxical incontinence.

*Rectal Examination.*—(a) Inspection. Prolapsus ani or recti is frequently observed.

(b) Palpation. On rectal examination, the palpating finger recognizes the existence of atony and relaxation. The rectal sphincter is relaxed and easily allows the introduction of one or more fingers without the slightest evidence of pain to the patient. The rectum itself is flabby and ballooned out, as though it had been previously distended with air.

*Catheterization.*—On introducing the catheter, it generally meets an obstruction at the bulbo-membranous junction, which is the external sphincter in a state of spastic contraction, for on this muscle seems to depend the entire control. Occasionally the anterior urethra is spastic and obstructs the passage of the instrument. There exists a paralytic internal vesical sphincter and detrusor, while the external sphincter is spastic. As the catheter enters the bladder a varying quantity of residual urine is almost constantly found, in several instances amounting to 1,000 c.cm. and over. If the catheter is slowly withdrawn after emptying the bladder, a flow is again obtained from the region of the posterior urethra, and this may continue until the catheter is withdrawn beyond the external sphincter. The flow through the catheter is slow and lacks force, and is only slightly influenced by straining on the part of the patient.

*Urine.*—Many of the cases have a clear sparkling urine, but the finding of pus and bacteria is common, and blood was found in several complicated cases.

*Cystoscopic Examination.*—The cystoscope glides easily into the bladder, after passing the external sphincter, generally finding no obstruction at the vesical neck.

*Sphincter.*—The internal sphincter is relaxed and allows the cystoscope to be withdrawn with the eye-piece well depressed, and a view is obtained of the posterior urethra, first the longitudinal folds of the supramontane urethra appearing and then as the instrument is further withdrawn, the verumontanum comes into view as a large, pale pink bulbous elevation on the floor of the urethra. In pronounced cases, the urethra in front of verumontanum can be cystoscoped. At times the ejaculatory ducts are seen lying to each side of the verumontanum, and the utricular orifice can be recognized.

*Trabeculation.*—Trabeculation is seen on the base, laterally in the fornices and even over the dome. Occasionally no trabeculation is seen, or it is very early and moderate in extent. We have been unable to agree entirely with Koll, who believes that there is a characteristic trabeculation which selects the lateral fornices for its location. We have been unable to see any particular difference between this trabeculation and that back of any obstruction, with the exception of the trigone.

*Trigone.*—The trigone is not thick and husky as is ordinarily seen back of obstruction, but is rather thinned out and veil-like. Laterally it loses itself by dividing into trabeculæ, analogous to the chordæ tendinæ of the heart at their basal attachments. At times the delicate wave-like trigone stands out like a dividing curtain.

*Ureters.*—Ureteric peristalsis is slow and sluggish, about five to six contractions to the minute.

*Functional Test.*—Phthalein combined functional test shows delayed time of appearance and diminished output, usually proportional to the amount of residual urine.

*Endoscopy.*—It is found to be very difficult to keep the endoscopic field dry, as urine seems to be ejected directly from the ureteral orifices into the posterior urethra and over the verumontanum, so that during the examination of the posterior urethra, the operator is kept busily engaged constantly swabbing urine from the field.

*X-ray.*—X-ray pictures were taken of several cases with the bladder filled with 10 per cent. proteid silver compound. These bladders were filled in the clinic, patients allowed to walk up two flights of stairs to the x-ray department, in the hope of allowing more chance for the fluid to gravitate into the prostatic urethra. One pronounced tabetic fell on his way to the x-ray room. The pictures of all show a well-defined clean-cut boundary between the internal vesical orifice and urethra, with no silver solution in the urethra. This was a great surprise, as we felt sure that the urethra and bladder formed a common cavity, owing to the marked sphinc-

ter relaxation seen with the cystoscope. Evidently there is a sufficient amount of tone to resist a certain pressure, but this is overcome when any foreign body, such as the cystoscope or catheter enters the orifice. Other observers have noticed a funneling, with the collargol in the prostatic urethra. Why our cases did not show it, we are at a loss to explain; but we are confident that there does not exist a more incoordinate, thoroughly limp group of tabetics than some of these we have studied.

*Complications.*—The most frequent complication met with in these bladders is cystitis, which occurred frequently, but generally was amenable to treatment. Pyelonephritis was present in its usual proportion following pronounced obstruction at the neck.

Paradoxical incontinence, especially nocturnal, was often noted, and an absolute loss of control, true incontinence, occurred in 2 cases.

Acute complete retention occurred in several patients. In one patient it immediately followed instrumentation and lasted for several days. This was evidently due to the increased spasticity of the external sphincter. Two patients presented hemorrhage occurring spontaneously and profusely. Bleeding came in both cases from the prostatic urethra. Both were checked by adrenalin. Both of these hemorrhage cases occurred associated with terrific crises. Prostatic hypertrophy occurred in several instances in association with tabes, and it is easy to see how the unsuspecting surgeon might easily remove the prostate and secure a disastrous result, particularly incontinence. We firmly believe that many cases of incontinence attributed to prostatectomy, particularly to the perineal route, have been due to the removal of the gland in patients suffering with tabes. Indeed, it is a wonder why this does not happen more frequently, as so many general surgeons still remove prostatic obstructions without a preliminary cystoscopic study of the bladder orifice. There were 2 cases of extensive carcinoma of the bladder associated with tabes. Nothing was done for their relief.

*Treatment.*—*General treatment* embodies the proper care in hygiene and diet in an attempt to keep the physical condition in as good shape as possible; careful attention to the bowels and tonics are indicated; urinary antiseptics, particularly urotropin in good size doses are given as routine. Cases with positive Wassermann reaction are treated in the neurological clinic with specific remedies.

*Local Treatment.*—Our particular interest concerns the local treatment of these poor unfortunates. As far as their vesical condition is concerned they have frequently passed unnoticed and neglected, even those in extreme with bladder overflow have had their bladders treated only through pity. After our experience in handling this series of cases we are firmly convinced that an enor-



mous benefit can be given these individuals and many of them can be made entirely comfortable; some of the patients with early involvements can be practically relieved of every bladder symptom.

The method of treating such bladders varies according to whether or not there is residual urine. The early cases without residual urine are treated with the idea of relieving their irritability and keeping them clean, and training them to exercise their weakened and lagging musculature. Treatment of these cases is very much similar to chronic posterior urethral infections—namely, massages, dilatations, instillations and applications to the urethra. Coupled with this, the patients are instructed to try to empty their bladders thoroughly, and to start and stop the stream at frequent intervals during the act of urination in order to strengthen the muscle fibres which remain. It is extremely important that the highest degree of asepsis be observed in any manipulations on these individuals. After repeated treatments to this class, we believe we can truthfully say that we have seen no infection.

Patients with residual urine, whether infected or not, are treated in a similar manner to the other group, but in addition, with systematic daily catheterization and irrigation, the infected bladders and, in many cases, kidneys have universally improved and frequently been made clean. Those individuals with residual urine who were uninfected on admission have in several instances, even after our scrupulous asepsis, become infected, but such infections have been mild and temporary, and have promptly cleared up, the residual urines having invariably lessened and in many instances entirely disappeared, so that patients, who had been previously bothered with constant dribbling of urine, have been made to urinate quite naturally without incontinence. We know of no more appreciative patients in the world than this class. One patient in particular who had a good-sized residual urine three years ago, and who was bothered with incontinence, at present empties his bladder completely and does not have the slightest incontinence. During the last year he has received only occasional local treatments. This case, of course, is exceptional, but we are confident that if we had not in the beginning catheterized him regularly and released his bladder from distention, which is an important factor in depleting the muscle fibres which remain, he would have been a dribbler at the present time.

In the face of the comforting results which we have seen, we hope that the profession will appreciate that bladders of these paralytics need attention and that surprisingly good results may be obtained.

In closing, we are confident that a diagnosis can almost always be made of tabes and spinal cord disease by the cystoscopic picture of the bladder—in many cases before any other lesion becomes

manifest. For in this series this characteristic picture was observed in two individuals who had been given a negative neurological examination and who later showed evidences of spinal cord tumor which were confirmed by autopsy in one case, and operation in the other. Furthermore, we trust that the deplorable neglect in the treatment of the paralytic bladder will cease to be so universal, and that these individuals will be given the advantages of treatment as well as any other class of patients.

## LYMPHOCYTES IN TUBERCULOSIS.

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By ROLAND S. CUMMINGS, M. D., of Los Angeles, Cal.

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There are but few diseases in which definite blood changes cannot be shown, and probably none of bacterial origin in which at some time during the infection some constituent of the blood is not definitely changed from the normal.

In many diseases, due to bacterial infection, the prominent blood change is an increase of the polynuclear leucocytes. This is probably due to the fact that in those diseases accompanied by a leucocytosis, the destruction of the infecting organisms rests largely with the opsonins and phagocytes. The greater the increase of leucocytes the greater the resistance of the body.

In tuberculosis, however, this is not the case, for it would appear from the report of our cases that the greater the number of lymphocytes the greater the resistance to tuberculosis, and the smaller the percentage of lymphocytes and the greater the percentage of polynuclears the less the resistance to the tuberculous infection.

This would lead us to believe that the lymphocytes played some rôle in the production of immunity to tuberculosis. Other facts indicate the same thing, such as the great resistance of children above the age of two or three years. Although children having no immunity become infected easily, yet they soon overcome the infection, thus indicating a good resistance to the disease. It is a well-known fact that children have a high percentage of lymphocytes.

Also a few hours after the injection of cockroaches with tubercle bacilli, they can be found in the blood in all stages of dissolution. It appears that the cockroach has no polynuclear cells, but lymphocytes only. In infectious diseases the rôle of the polynuclear cells is one of phagocytosis, but the lymphocytes are not phagocytes, therefore what can be their function?

In the production of immunity to tuberculosis it is an easy matter to produce lysins to split the proteid material of the bacilli, but the difficulty apparently lies with the waxy capsule which seems to protect the body of the bacillus from the lysins of the blood. Nothing has yet been obtained which will readily split up this capsule.

Another point of interest in this connection is the experiment of Webb, in which he placed the pus from a cold abscess upon beeswax. After a few hours he found that the pus had digested the



surface of the wax. Can it be possible then, that the function of the lymphocytes in tuberculosis is to digest the lipid capsule of the tubercle bacilli?

In making our blood examinations, Wright's blood-stain prepared freshly every few days was used exclusively. In each differential count 250 cells were counted, 125 on each of two cover-slip smears. Thus, when the number of each variety of cells was multiplied by .4, the result would be the percentage of each appearing in the smear.

Two hundred and ninety differential counts were made in all, 40 being made in 22 apparently healthy persons between the ages of eighteen and fifty, and 250 being made upon 100 patients having chronic pulmonary tuberculosis.

Of the 40 normal counts the highest percentage of lymphocytes was 46.5 per cent.; the lowest was 20 per cent., the average being 30.5 per cent. This corresponds closely with Bunting's count at the University of Wisconsin.

The tuberculous patients were divided into three stages according to the classification of Turban. The following table shows the percentage in Stages II and III, there being no patients in Stage I.

	No. of patients.	Highest percentage of lymphocytes.	Lowest percentage of lymphocytes.	Average percentage of lymphocytes.
Stage II.	72	54.4 per cent.	10.0 per cent.	28.6 per cent.
Stage III.	28	37.9 per cent.	6.4 per cent.	19 per cent.

From this table note the variation between the highest and the lowest counts. The explanation for this is that some patients in very good condition had to be classed in Stage III and even when cured would still remain in this stage, as the Turban classification is pathological. Also some patients classed in Stage II seemed to have a very low resistance and were getting worse, hence a low lymphocyte count.

Clinically a prognosis was made in each case, thus enabling us to divide them into three classes, according to their individual outlook for recovery. The three divisions were prognosis good, questionable, or bad.

The following table gives the percentage of lymphocytes found in each of the three divisions.

	No. of patients.	Highest percentage of lymphocytes.	Lowest percentage of lymphocytes.	Average percentage of lymphocytes.
Prognosis good.	73	54.5 per cent.	10 per cent.	27.4 per cent.
Prognosis questionable.	9	27.5 per cent.	13 per cent.	21.2 per cent.
Prognosis bad.	18	27 per cent.	6.5 per cent.	16 per cent.

In this table also the wide variation between the greatest and smallest percentage is noted. This can in part be explained by the fact that some of the counts were made in the class of 'prognosis good' while the patient was recovering from some acute illness, as influenza. This was the case in the patient having the lowest percentage in the class of 'prognosis good.'

The average percentage, however, is very indicative, the lymphocytes gradually decreasing as the patient's chances for recovery diminished.

From a review of these 100 patients we might conclude:—

1. That if the lymphocytes are below 20 per cent. it is seldom that the outlook is good.

2. That when the lymphocytes are above 25 per cent. it is indicative of an increased resistance to the tuberculous infection and that as a rule the prognosis will be good.

1240 Merchants National Bank Building.

## SPECIAL ARTICLE.

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### 'LITTLE CLASSICS' PHYSICIANS MAY HAVE OVERLOOKED.

[It has often occurred to the Literary Editor of the JOURNAL that the columns of our various medical journals could be greatly enriched by republishing essays or sketches of a distinctly high literary order, written by authors of the first rank and with enough of medicine in them to make them profitable reading to physicians. With this idea in mind the JOURNAL will reprint in every issue during 1916 a contribution which may bring to the knowledge of the physician many choice bits of literature somehow overlooked by him and with which he should be conversant if only to realize how closely literature and medicine are united. In this number the readers will have the pleasure of reading the masterly essay on the personal experiences of J. M. Synge, the brilliant Irish dramatist, whilst under the influence of ether.]

### UNDER ETHER.

#### PERSONAL EXPERIENCES DURING AN OPERATION.

By J. M. SYNGE.

The operation was fixed for Saturday; so at ten o'clock on Friday evening I found myself at the door of the private hospital where I was to lodge. I was received in the office by Nurse Smith. . . . Nurse Smith gave me her parting directions—I was to be in bed before midnight, when a night nurse would come round to bandage my neck—and went off to other duties. The door closed behind her and I was alone. For a while I roved through my room, peering into cupboards and presses, half dreading to unearth the débris of mutilated victims. Then I sank into a chair, and drew out the last volume I had been studying. It was Spinoza's ethics, and I found my excited thoughts refused the lead of the great pantheist, and I abandoned myself again to incoherent reverie till eleven and a half struck heavily on the clock before my door. Then I unpacked the few necessities I had brought with me and arranged them in drawers with which the room abounded, and went to bed in a few moments.

Next morning I found the operation was not to take place till mid-day, so I had long to wait.

At half-past eleven I slipped down to get a look at the preparations in my own room. They were worth seeing. In the window stood a long stretcher, some four feet high and two wide, rigged out as a bed but looking ghastly enough. Every available table was covered with enamelled hardware, showing many fantastic shapes whose use I was yet to learn. Strange bottles stood in



groups beside articles I had never seen, even in the windows of surgical outfitters. My room looked south, and the low winter sun threw in an almost dazzling illumination at the large panes from which all blinds had been removed. While I was taking an inventory of what was to be seen a nurse came in, and was horrified to find me on the scene of action. Patients, as I afterwards learned, are banished till the last moment to avoid needless anxiety.

The doctors were now announced, and I was hurried upstairs to give them a moment to make ready their own instruments. In a few minutes Nurse Smith came and brought me down. Three doctors were awaiting me, and I was followed by Nurse Smith and two younger nurses. I was irritated by the solemnity of the whole party. When I tried jokes on my own account they met them with sickly smiles, as an attempt to cloak a timidity I did not feel. In a moment the surgeon directed me to mount the scaffold. At other times one would feel an embarrassment in divesting oneself to a single smock in the presence of three young women, but it seemed as natural in the circumstances as walking bareheaded in a church. I mounted the operating table, warning them as I did so that they would have no slight task to retain me on my plank bed. The moment my head touched the pillow one of the doctors bent over me to test my heart. An instant later he placed something over my mouth and nose directing me to breathe with usual regularity. He was standing behind my head, so I saw only his face stooping above me. I clasped my hands over my breast, and decided to allow my fingers some motion to let off the inevitable excitement. The only anxiety I remember to have felt was lest I should become unruly as the ether gained on me, and disgrace my stoic resolution.

For what seemed an eternity no change came. Suddenly the light grew brighter, and a rigidity tingled through my limbs. It was not pleasant, and I felt my fingers flying in a rhythm of fearful velocity. Even this was not enough; my toes—always agile as a monkey's—joined in the dance. I wondered how long I could retain self-control in presence of such awful discomfort. A change passed across me, and my fingers locked with sudden stiffness. Speech was gone. Volition was gone. I was a dead weight; a subject on a board; toy of other wills. It was agony. My eyes rolled swiftly from one side to the other, seeing now with phantasmal and horrible distortion. A break came, and I forgot one moment where I was. I passed again into sense; my mouth was uncovered; no one seemed at hand. Horrible noises were in my ears. The ceiling, which now shone with terrible distinctness, seemed bending over the nurses; and the nurses, some without heads, some with two, were floating in the air. Voices were behind me. Fifty suggestions flashed through my brain; had the ether apparatus broken? Did they think me insensible? Would

I have to lie feeling all with treble intensity, unable to speak or move? I raised myself on my elbows and asked with sudden effort:

"What has happened?" .

Two doctors were at my side in an instant. They assured me that I was doing excellently, and begged me to lie still for my further dose of ether.

Now I was told to draw long breaths, and I drew eagerly and angrily resolved to put myself, at any cost, out of pain.

I felt what seemed currents of blue vapour curling to my utmost extremities. Suddenly I was in a chaos of excitement, talking loudly and incoherently. Clouds of luminous mist were swirling round me, through which heads broke only at intervals. I felt I was talking of a lady I had known years before, and sudden terror seized me that I should spread forth all the secrets of my life. I could not be silent. The name was on my lips. With wild horror I screamed:

"Oh, no, I won't!"

"No, I won't!"

"No, I won't!"

"Oh, no, I won't!"

"No, I won't!"

"No, I won't!"

Using the sullen rhythm that forms in one's head during a railway journey. This did not suffice; I changed to a shrieking imprecation. Another blast of ether rolled through my veins. My hands broke from my control and waved in the luminous clouds. I saw them, and in an instant one hand went out before the other, my fingers spread and one thumb approached my nose after the manner of a street arab. At the same moment the clouds rolled aside, and I saw the doctor bending over me. He called to the surgeon:

"Batby, look!"

The words reached me, and I echoed:

"Batby, look, amn't I funny?"

They laughed aloud.

"Now you're laughing," I cried: "Ha, ha, ha!" Mimicking with a frantic crescendo. Then their mirth infuriated me.

"I'm an initiated mystic," I yelled with fury; "I could rend the groundwork of your souls."

Not wishing to exasperate me they grew serious. "Ha, ha, ha!" I roared in ironical triumph, "now you're serious. Now you know what you have to deal with."

The clouds rolled over me again, now heavy now opaque. Something thrilled in my neck. Were they beginning? The memory of control was obliterated; I yelled, I writhed with appalling

agony. Another paroxysm of frenzy, and my life seemed to go out in one spiral yell to the unknown.

The next period I remember but vaguely. I seemed to traverse whole epochs of desolation and bliss. All secrets were open before me, and simple as the universe to its God. Now and then something recalled my physical life, and I smiled at what seemed a moment of sickly infancy. At other times I felt I might return to earth, and laughed aloud to think what a god I should be among men. For there could be no more terror in my life. I was a light, a joy.

These earthly recollections were few and faint, for the rest I was in raptures I have no power to translate. At last clouds came over me again. My joy seemed slipping from my grasp, and at times I touched the memory of the operation as one gropes for a forgotten dream. I heard noises and grew conscious of weight. The weight took shape; it was my body lying motionless in a bed. The clouds broke, and I saw a gaselier over my head. I realized with intense horror that my visions were fleeing away, leaving scarcely a trace. I groaned in misery.

"Oh, if I could only remember! If I could only remember—remember."

I was sick, and people were attending me.

I groaned still: "Oh, if I could only remember."

The clouds rolled further away; I recognized one of the nurses, and called out to her with sudden incongruity:

"By Jove, there's Nurse Smith!"

She heard me, and bending over me she said: "Are you coming to? It was very satisfactory?" "What was satisfactory?" I asked, still dwelling on my dreams.

"The operation," she replied.

"D—— the operation," I groaned. "If I could only remember, I'd write books upon books; I'd teach all earth of delight."

Every moment the recollection of my dreams was going off from me, being replaced by drunken exhilaration.

I was still suffering a good deal from nausea, but was so impressed with my wit that my drunken vanity left no room for low spirits. At this stage I began to regain power over my body; I remember moving each limb in succession, calling out in delight as I did so:

"There goes one leg. There's the other. There's one hand. There's the other."

Then I tried to raise my head but failed, and apostrophized it in language too racy to repeat.

Presently the nurses left me for their dinner, putting a hand-bell in easy reach.

The nausea returned and I rang lustily. My hand was still weak,



and the bell slipped from my hold, tumbling nearly into my mouth. When the nurses ran in I cried out in mock anger:

"Why the devil do you leave a fellow alone like that, I've been sick into the bell!"

This was my last joke, and for the rest of the afternoon and evening I lay quiet enough.

The next day I felt unenterprising enough but in no pain or uneasiness. My weakness made it most natural and agreeable of all things to lie still and be talked to. The room I occupied opened from a hall, so a pleasant stir outside kept me gently alert. The doctors looked in during the forenoon, and now that the ordeal was over, threw aside their gravity, and were as jovial as one could desire.

When they left me I looked vaguely through some books that were brought to me, and here became aware of my own collapse, for all allusion to sadness or affairs of the heart sent up a dew into my eyes. That afternoon my friends were admitted to see me, and my weakness came still more to the front. From five o'clock deep drowsiness came over me, and I lay as in lethargy with the lights carefully lowered. A faint jingle of tram-bells sounded far away, and the voices of Sunday travellers sometimes broke into my room. I took notice of every familiar occurrence as if it were something I had come back to from a distant country. The impression was very strong on me that I had died the preceding day and come to life again, and this impression has never changed.

# MEDICAL AND SURGICAL PROGRESS.

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## THE MODERN EXPLANATION OF SEX.

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By W. M. SMALLWOOD, Ph. D., of Syracuse, N. Y.,  
Professor of Comparative Anatomy, Syracuse University.

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I prefer to use the phrase explanation of sex in place of the widely accepted term, the determination of sex. With all of the recent progress in this technical field and the new books on sex determination, what we are really coming to understand is, what the factors are that are important in producing a male or female. We shall be utterly unable to determine sex in advance until we can control the male or female determining factors.

"The cause of sex has been a favorite subject of speculation for thousands of years. Hundreds of hypotheses have been advanced to explain this perennially interesting phenomenon. The causes of sex determination have been ascribed to almost every possible external or internal influence, and the world is full of people who think that they have discovered by personal experience just how sex is determined. Unfortunately these hypotheses and rules are generally founded upon a few observations of selected cases. Since there are only two sexes the chances are that any hypothesis will be right half of the time, and if only one forgets the failures of a rule and remembers the times when it holds good, it is possible to believe in the influence of food or temperature or age, of war or peace, or education on the relative numbers of the sexes, or on almost any other thing. By statistics it has been shown that each of these things influences the sex ratio, and by more extensive statistics it has been proved that they do not" (Conklin).

A brief statement of the more important biological facts associated with sex are necessary before discussing the modern explanation of sex. In the simplest animals such as the protozoa, there is no such thing as sex unless one claims that the process of conjugation satisfies the elementary requirements in distinguishing sex. But here the process is but temporary and largely physiological, with the authorities differing as to its significance. If the term sex is applied to these simple animals, it means something different for there is no differentiation into body or soma cells and germ cells. As soon as definite cells were set apart for the sole purpose of reproduction, then it became proper to speak of such animals as having sex.

"To-day we are only beginning to appreciate the far-reaching significance of this separation into the immortal germ-cells and the mortal body, for there emerges the possibility of endless relations between the body on the one hand and the germ-cells on the other. Whatever the body shows in the way of new characters or new

ways of reacting must somehow be represented in the germ cells if such characters are to be perpetuated. The germ-cells show no visible modification to represent their potential characters. Hence the classical conundrum—whether the hen appeared before the egg or the egg before the hen? Modern biology has answered the question with some assurance. The egg came first, the hen afterwards, we answer dogmatically, because we can understand how any change in the egg will show itself in the next generation—in the new hen, for instance—but despite a vast amount of arguing no one has shown how a *new* hen could get her newness into old-fashioned eggs” (Morgan).

After we pass over into the many-celled animals sex becomes universal and the fundamental facts of reproduction similar. The sperm nucleus unites with the mature egg nucleus and the embryo begins to segment.\* In a number of animals, the cells that are to give rise to the germ-cells become early differentiated from the rest. In the parasitic thread worm, *Ascaris*, Boveri believes that the parental germ cell can be recognized in the four-cell stage. Even in the vertebrates these early germ cells make their appearance before the main organ systems can be recognized. Taking a general survey of the development of animals, we may say that the germ-cells are frequently the first set of cells to be set apart in the developing embryo. These are the cells that lose their power to produce somatic tissues and remain as single cells.

About the easiest way to understand the technical aspects of the mechanism of sex-determination is to select a convenient animal and follow the several changes by means of diagrams. Such an outline is found in Morgan's book on “Heredity and Sex” from which the following description and diagrams are taken.

If we study by means of modern histological methods the body cells of the male of the insect, *Protenor belfragei*, we find when each cell is about to divide, that a group of chromosomes appears like that shown in Fig. I,A. There are twelve ordinary oval chromosomes, and one much larger than the rest. This group of chromosomes is characteristic of all divisions of all of the cells of the body, regardless of whether the cells belong to the skin, muscle, gland, ganglion, or connective-tissue. The early germ-cells of the male, the so-called spermatogonia, also have the same number. It is not until a later stage in their development that a remarkable change takes place in them. When this change occurs the thread-like chromosomes unite in pairs. This is the synapsis stage—the word means to fuse together.

It is the most difficult stage to interpret in the whole history of the germ cells. In a few hours where the changes that take place have been seen to best advantage it is found that chromosomes are in the form of long threads and that these threads unite in pairs to make thicker threads. When the process is completed, we find half as many threads as there were before. This statement is not quite true. In the case of the male *protenor*, for instance, there are twelve ordinary chromosomes and one large one. The twelve unite in pairs at synapsis, so that there are six double chromosomes, but the large one has no mate (Fig. I,B). When the others have united in synapsis, it has taken no part in the process, hence the reduced

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\*For details of fertilization see article on Heredity in the December (1915) issue of the JOURNAL.



number of chromosomes in the male is seven—the seventh is the sex chromosome.

Two divisions now follow each other in rapid succession (Fig. I,C,D). In the first division C, each chromosome divides—seven go to one pole and seven to the other pole. Two cells, the primary spermatocytes, are produced. Without resting another division takes place D, in each of these two cells. It is the second spermatocyte division. Each of the six ordinary chromosomes divides, but the large sex chromosome does not divide, and, lagging behind the others, as shown in the Fig. D, it passes to one pole. Each secondary spermatocyte produces, therefore, two cells—one with six, the other with seven chromosomes. These cells become spermatozoa EE, the ones with seven chromosomes are the female-producing spermatozoa, the ones with six are the male-producing spermatozoa. These two classes of spermatozoa are present in equal numbers.

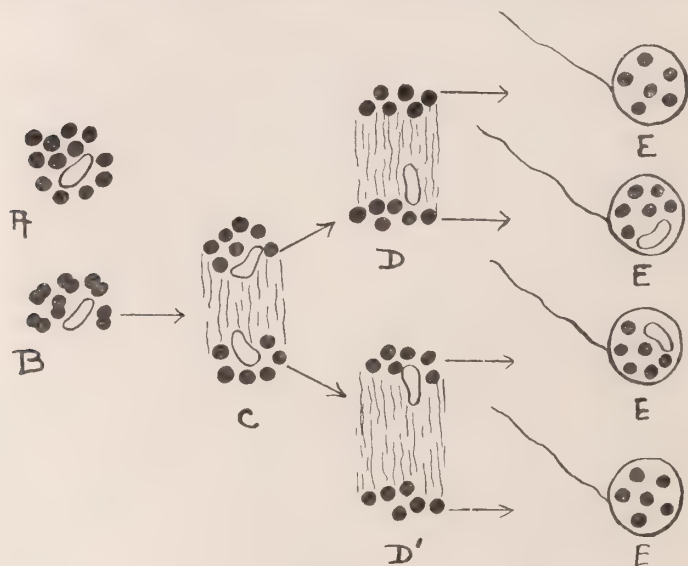


Fig. 1.

If we study the body cells of the female protenor, we find fourteen chromosomes (Fig. 2,A). Twelve of these are the ordinary chromosomes, and two, larger than the rest, are the sex chromosomes. At the synapsis stage all of the chromosomes unite in pairs, including the two sex chromosomes. When the process is finished, there are seven double chromosomes (Fig. 2,B).

When the egg sends off its two polar bodies, the chromosomes divide or separate. At the first division seven chromosomes pass out C, and seven remain in the egg. At the next division the seven chromosomes in the egg divide again, seven pass out and seven remain in the egg D. Of these seven, one chromosome, recognizable by its large size, is the sex chromosome.

All the eggs are alike (E). There is only one kind of egg, but there are two kinds of sperms. Any egg that is fertilized by a sperm carrying six chromosomes produces an individual with thirteen chromosomes. This individual is a male.

Any egg that is fertilized by a sperm carrying seven chromosomes

produces an individual with fourteen chromosomes. This individual is a female.

The number of animals that reveal this unequal number of chromosomes in the sperms is so large that the experts in this field believe it to be a general condition. In some instances one of the chromosomes becomes specialized and the sex-determining factor is supposed to be associated with this large chromosome. Even in man sex is to be explained on the basis of two kinds of sperms. There are 47 chromosomes in man according to Winiwarter and one of these is the accessory chromosome. When these unite in synapsis, 28 pairs are formed and one is unpaired. In the subsequent changes similar to those described for protenor, the sex chromosome goes entire into one of the daughter cells. The result is that there will be one set of sperms with 23 chromosomes, and another set with 24 chromosomes. In the human ovum there are 48 chromosomes which reduce to 24 in synapsis. If the ovum is fer-

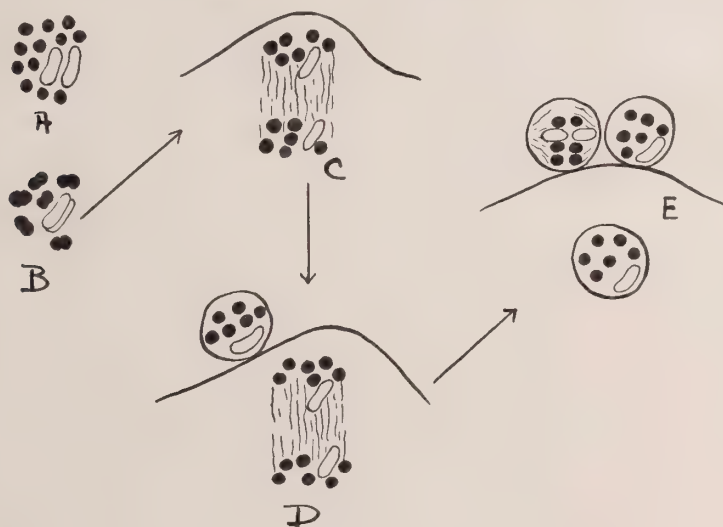


Fig. 2.

tilized by a sperm containing 24 chromosomes there results an individual with 48 chromosomes as the regular somatic number. Such an individual will be a female. On the other hand if the ovum is fertilized by a sperm containing 23 chromosomes, an individual is produced with 47 as the regular somatic number of chromosomes. Such an individual will be a male.

The sex-determining factor is double in the resulting female and single in the males. In this sense the result works out on the Mendelian theory of dominance (see previous paper on Heredity). In the chance crossings one-half of the eggs will be fertilized by male producing sperms and one-half by the female producing sperms. Intimately associated with the development of sex are many secondary sexual characters, many of which are limited either to the male or female. This has given rise to the expression sex-limited characters.

In contrast to the sex-limited are the sex-linked which are in no wise connected with sexual reproduction. Sex-linked characters

are not limited to one sex and are frequently transmitted from father to daughter or from mother to son. This 'criss-cross' inheritance acts in a similar manner to the sex chromosomes. Morgan holds that the determiners for such combinations are carried by the sex chromosome and so properly called sex-linked.

While Morgan has worked out some 25 sex-linked characters in the sour-fly, *Drosophila*, one illustration must suffice. The eyes of the wild fruit-fly, *Drosophila ampelophila*, are red. "In my cultures a male appeared that had white eyes. He was mated to a red-eyed female. The offspring were all red-eyed—both males and females. These were inbred and produced in the next generation red-eyed females, red-eyed males and white-eyed males. There were no white-eyed females. The white-eyed father had transmitted white eyes to half of his grandsons but to none of his granddaughters.

"Equally important are the numerical proportions in which the colors appear in the grandchildren. There are as many females as the two classes of males taken together; half of the males have red eyes, and half have white eyes. The proportions are therefore 50 per cent. red females, 25 per cent. red males, 25 per cent. white males.

"Only white-eyed females had appeared at this time. It may seem that the eye-color is confined to the male sex. Hence the origin of the term sex-linked inheritance for cases like this. But white-eyed females may be produced easily. If some of the red-eyed granddaughters are bred to these white-eyed males, both white-eyed females and males, and red-eyed females appear. The white eye is therefore not sex-limited but sex-linked."

Two common defects in man seem to be sex-linked. These are hemophilia and color blindness. An excellent chart of the Mampel family of bleeders is found in the *Deutsch. Zeitschr. fuer Chirurgie*, Vol. 76. This family has been worked out for six generations. Here the males of the family alone have been bleeders but have not transmitted the hemophilic diathesis. The females have never been hemophilic but have transmitted the diathesis.

Before closing this brief summary of the question of sex explanation, it should be pointed out that there are possibly some other factors that influence inheritance. Conklin calls attention to the difficulty in accepting the chromosomes as being solely responsible for inheritance. "The developmental test proves that there must be as many kinds of germ cells as there are different kinds of individuals which come from germs. It is one of the marvelous facts of biology that every individual that has been produced sexually is unique, the first and last of its identical kind, and although some of these individual differences are due to varying environment, others are evidently due to germinal differences, so that we must conclude that every fertilized egg cell differs in some respect from every other.

"But are there molecules and atoms enough in a tiny germ cell, such as a spermatozoan, to allow of all of these differences? Miescher has shown that a molecule of albumen with 40 carbon atoms may have as many as one billion stereoisomers, and in protoplasm there are many kinds of albumen and proteins, some with probably more than 700 carbon atoms. In such a complex substance as protoplasm the possible variations in molecular constitu-



tion must be wellnigh infinite, and it cannot be objected on this ground that it is chemically and physically impossible to have as many varieties of germ cells as there are different kinds of individuals in the world.

"Even with regard to morphological elements which may be seen with the microscope it can be shown that an enormous number of permutations is possible. It seems probable as Boveri has shown, that different chromosomes of the fertilized egg differ in hereditary potencies, and where the number of chromosomes is fairly large the number of possible combinations of these chromosomes in the germ cells becomes very great. In woman, there are probably 48 chromosomes, and after synapsis, 24 pairs of maternal and paternal ones, the possible number of permutations in the distributions of these chromosomes to the different egg cells would be  $(2)^{24}$ , or 16,777,036, and in the possible number of different types of fertilized eggs or oöspers which could be produced by a single pair of parents would be  $(16,776,036)^2$ , or approximately three hundred thousand billion. But probably other things than chromosomes differ in different germ cells, and it is by no means certain that individual chromosomes are always composed of the same chromomeres, or units of the next smaller order, and in view of these possibilities it may be that every human germ cell differs morphologically and physiologically from every other one, in short that every oöspers and every individual which develops from it is absolutely unique."

The problem of sex and heredity is on a firmer theoretical basis than ever before and the main facts of the theory are fairly well substantiated by cytology and experiment. However we are just as far as ever from being able to determine in advance what the inheritance or the sex shall be.

The general references in the article on Heredity (*INTERSTATE MED. JOUR.*, December, 1915) apply to this review. To them should be added Morgan's book on "Heredity and Sex," in which there is a full list of sex literature.

## DIAGNOSTIC AND THERAPEUTIC NOTES.

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BRAIN LIPOID AS A HÆMOSTATIC.—Hirschfelder (*Lancet*, September 4th, 1915). Howell has shown that the so-called fibrin ferment is not a true ferment at all, but a lipoid substance which seems identical with the diphosphatide kephalin, first isolated from the brain by Thudichum. The kephalins, on the other hand, are present in relatively large quantities in brain tissue. They are only slightly soluble in cold alcohol, but readily soluble in ether. For the purposes of military surgery it is important to obtain an active substance by the simplest possible method, and the following procedure was resorted to in the experiments reported by Hirschfelder.

Ox brain was covered with three volumes of alcohol, shaken up two or three times, and the excess of alcohol then poured off and squeezed out gently through linen, care being taken to avoid great force in wringing out the alcohol, as this tends to break up the brain tissue into very finely divided particles which pass through the filter. The residue is then covered with three volumes of ether, shaken vigorously, and filtered first through cotton and then through filter-paper. The clear filtrate thus obtained is evaporated to dryness over a water bath and a yellow residue remains. This residue consists largely of kephalin, but though the latter is not in the pure state it is extremely active in accelerating the clotting of blood *in vitro*.

In animal experiment, also, the hemostatic value of kephalin is great, being very striking in capillary or venous oozing and unmistakable even in vigorous arterial hemorrhage. The relative ease and cheapness of its preparation renders it particularly useful for the purposes of first aid in military and emergency surgery.

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TREATMENT OF CHRONIC CONSTIPATION.—Kohnstamm and Oppenheimer (*Therapie der Gegenw.*, 1915, No. 8). The writers believe that chronic constipation is due to autointoxication with the products of meat digestion. Their patients are put on a lacto-vegetable diet, being forbidden to eat even small amounts of meat, fish, or fowl, but are permitted to have meat soups and meat extracts. Milk is given freely, in part at least as buttermilk. In addition the inclusion of certain seeds in the dietary is recommended. Of these the best are linseed and flaxseed (*semen lini* and *semen psylli*), one or two ounces of the former, or one-third of this quantity of the latter daily, stewed in soup or with fruit. The seeds must not be chewed but should be swallowed whole. Their richness in mucilage makes the feces bulkier and more slippery. They are said to be entirely unirritating.

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PROLONGED REST IN THE TREATMENT OF HEART DISEASE IN THE YOUNG.—Barton (*Lancet*, September 11th, 1915). The prognosis

in cases of heart disease among children is usually very bad, chiefly because of the difficulty of keeping them quiet for a sufficiently long period. That this is really the crux of the matter is shown by the very encouraging results obtained at a small cottage home near London, to which boys between ten and fourteen years of age with heart disease have been sent during the last five years from some of the London hospitals.

The boys are kept as long as necessary; slight cases stay one or two months, severe ones a year or more. The treatment begins with a prolonged stay in bed. When the boy begins to get up, he starts making wool mats, rugs, etc., which gives him an interest and keeps him employed. Later he is set at light outdoor work. The results have been most encouraging. Of the 29 cases, so far cared for, 17 are actively engaged in some light but remunerative occupation and are doing well.

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TREATMENT OF ANGINA PECTORIS.—Kohn (*Berl. klin. Wochenschr.*, No. 20, 1915). During the attack, morphine must be given in sufficient dose. If the pulse is not satisfactory, a cardiac stimulant is required, preferably caffein-sodium-benzoate 0.2-0.4 grm. hypodermically. This is to be preferred to digitalis. Nitrites are useful, especially the alcoholic solution of nitroglycerine, and hot applications to the precordium. Hot hand- and foot-baths are useful.

For prophylaxis, nothing is so good as some form of theobromin. Diuretin (theobromin sodio-salicylate) may be given in wafers, 1.0 grm. three times daily. Later, smaller doses should be given for a long time. Sodium or potassium iodide, 3.0-5.0 grm. daily until 100.0 grm. have been taken, is often useful, perhaps on account of the great frequency of syphilitic aortitis in these conditions. If syphilis can be excluded, much smaller doses (0.1-0.3 grm. daily) suffice. Digitalis is contraindicated.

Lukewarm baths are useful, especially in combination with the galvanic current. Diathermy and the high frequency current are worth trying. The diet should be restricted as regards quantity, avoiding especially meat and stimulants (tea, coffee, alcohol, tobacco).

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CLINICAL USE OF WATER MEAL.—Austin (*Boston Med. and Surg. Jour.*, June 10th, 1915). A modified Riegel meal, consisting of meat, potato, bread and butter, rice and raisins is given the patient a little before bedtime. Next morning, 350 c.cm. of water is given fasting. Twenty minutes later, the extreme limit at which the water normally leaves the stomach, it is removed. The water meal has the advantage of readily allowing one to see whether or not there is any residue left from the Riegel meal. Lactic acid, blood and bile are also much more readily detected in the absence of a mass of partly digested food.

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MEKONAL.—Schmidt (*Deutsch. med. Wochenschr.*, No. 30, 1915). At Momberg's clinic very satisfactory results have been obtained in insomnia with the following mixture:—

R	Morphine muriate . . . . .	0.003
	Veronal . . . . .	0.15
	Aspirine . . . . .	0.5



This combination has been marketed in tablet form, under the name mekonal, but can obviously be readily dispensed in capsule. A single dose at bedtime suffices for women or weak men; strong men require a double dose. It is said to be successful in producing sleep, even when the latter is inhibited by pain.

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TREATMENT OF DELIRIUM TREMENS.—Hudovernig (*Neurol. Zentralbl.*, No. 16, 1915). The usual treatment of severe alcoholism has hitherto been purely symptomatic. The writer believes, however, that in these cases the tissues, and especially those of the brain, are saturated with alcohol. The latter can best be removed by profuse sweating. For this purpose he gives pilocarpine muriate hypodermically, 0.005 grm. the first day, 0.01 grm. daily thereafter. The heart must be guarded by the administration of digitalis in suitable quantities. The results are said to be good, the mortality falling since the inauguration of this treatment from 28.5 per cent. to 6.7 per cent., the percentage of complete recovery rising from 58 per cent. to 80 per cent.

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TREATMENT OF EDEMA.—Palhault (*Jour. des Prat.*, March 20th, 1914; *Zentralbl. fuer die ges. Therap.*, p. 160, 1915). The edematous parts are wrapped in compresses wet with 2.5-5 per cent. salt solution; over this is placed a layer of cotton and the whole bandaged. Next day the dressings are saturated with fluid which may even soak through sheets and mattress. The dressing is renewed daily and often results in a disappearance of the edema when all other methods had proved futile. The patient meanwhile should be put on a dry diet.

## BOOK REVIEWS.

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DISEASES OF THE NERVOUS SYSTEM. A Text-Book of Neurology and Psychiatry. By Smith Ely Jelliffe, M. D., Ph.D., Adjunct Professor of Diseases of the Mind and Nervous System, New York Post-Graduate Medical School and Hospital; and William A. White, M. D., Superintendent of the Government Hospital for the Insane, Washington, D. C., etc. etc. Illustrated with 331 Engravings and 11 Plates. Philadelphia: Lea and Febiger. 1915. Price, \$6.00.

This book is chuck full of information. The authors have used the literature of neurology and psychiatry with industry and discrimination, picking and gathering facts, opinions, theories, and points of view. All this material has been set down with a compactness that excites the reviewer's admiration and envy. Yet there is a curious choking sensation to the book, as if the authors had had too big a neurological meal.

It is a very modern book in its point of view—a bit too up to date, one might say, for the intellectual timidity of the average reader. One would like to think of man as a metabolic animal, and the nervous system as a machine delicately timed and accurately devised to carry out all the demands of regulation; but what we really know at present hardly warrants an assumption of this kind. This is the keynote of the book, it seems to the reviewer—this notion to regard a scheme as necessary, then pile on as proof all the facts you can gather, and by sheer force of citation force the scheme down the throat of the reader as a piece of truth. So the authors begin with vegetative neurology, the autonomic system, and attempt to build up a clinical descriptive system, admitting, however, in the first few lines of these chapters that the thing is hardly possible. Nevertheless, the task is carried out with frequent citations from Hess, Espinger, Frœhlich, and others, with a wealth of quotations, authors' names, and queer physiological nomenclature, positive anatomical and physiological assertions that are simply overwhelming.

There is a certain rush to these chapters which leaves the reader out of breath, and he is brought up suddenly with a shock at seeing Wilson's disease concluding the chapter. It seems strange company for so platonic a disease to find itself in.

What neurologists used to call organic diseases are more conventionally classified and described, and the reviewer's praise is unstinted for the authors' industry, particularly in citations from the literature. Nothing of importance appears to be omitted, though there is less discrimination used in accentuating at times what seem facts of lesser importance. There is here to be found, likewise, a certain over-fullness and haste in gathering facts, as if completeness was more in the authors' minds than selection. The style here is too terse; too much like a catalogue; a kind of explosive quality develops, as though a bomb full of facts were set off at the beginning of each paragraph of importance.

The chapter on Paresis is very well done. It follows, as it logically should, Syphilis of the Nervous System, and the authors are here on safe ground, telling what there is known about this disease with a certain assured calmness, which is thoroughly enjoyable after the fireworks of the earlier chapters.

Part III is entitled "Psychoses or Symbolic Systems." The authors are both unafraid Freudians, and here the reviewer hoped to see a statement of the Freudian psychology that would be easily within the grasp of the average medical reader, and at the same time lead him into the way of thinking about neuroses in a Freudian fashion. There is disappointment here. The style of the authors becomes suddenly diffuse, prolix; the sentences lengthen interminably; and the reader, confused by the array of new and strange terms, by the long and involved sentences, will very likely cast the thing aside as unutterable nonsense.

The chapter on Anxiety Neuroses is almost a translation from Freud, largely taken, the reviewer believes, from Brill. This is to be regretted, for Freud is less easily understood on this subject than on many others, and Brill is by no means a happy translator.

The non-Freudian chapters are much more successful; that on manic-

depressive psychoses is easily one of the best to be found anywhere, and is in a way a model of clinical exposition of a very difficult subject. The book ends with a chapter on the defect group.

The illustrations are very well selected but are rarely original. They serve their purpose very well as a whole. Some of the photographs of pathological specimens are not of very great assistance in understanding the text.

After all, a book of this kind is a complex sort of thing with a lot of good and some very bad features, and the final judgment will be given by its many readers, which the reviewer trusts will show a constant and steady increase.

The chief fault in this book is seen in the attempt to make a subject, still in its developmental stage, too complete; and to do this too much has been jammed into its pages, which become filled with irrelevant, half-digested facts, some of which are sure to be discarded for new ones in the next edition.

A textbook should never be regarded as a complete digest of the literature. The authors' attempt to approach this ideal is, to the reviewer's mind, the chief defect.

**TEXTBOOK OF NERVOUS DISEASES.** For the Use of Students and Practitioners of Medicine. By Charles L. Dana, A. M., M. D., LL.D., Professor of Nervous Diseases in Cornell University Medical College, etc. etc. Eighth Edition. With Two Hundred and Sixty-Two Illustrations, Including Four Plates in Black and Color. New York: William Wood and Company. 1915. Price, \$4.25.

When a textbook has reached its eighth edition, the reviewer approaches the task of estimating its value with a certain amount of hesitation. This book of Dana's has fulfilled its purpose, and the medical public—a by no means fickle public—has placed upon it the seal of its constant approval; so why attempt to point out the deficiencies of the book, or try to show why this is not such a book as the author might well be expected to have written.

It should be said that there is a great deal of neurological information contained in it, which is well arranged, classified, and described. The descriptive style is uniformly well balanced, clear, and sequential. The illustrations are pertinent and gathered from well-recognized and authoritative sources. Those that are original with the author are selected with a great deal of care.

In spite of the many admirable qualities of this book, it is unsatisfying and scarcely reveals the unusual grip of all aspects of neurology which is so characteristic of Dana. One finds that he has tied himself down to some conventional standard of textbook making, and has let himself be tyrannized over by limitations of space and time. One asks why should Kaplan's opinion on serological questions be included, when all of us are much more interested in what the author thinks. Some one else writes of poliomyelitis, and the reviewer regards this as an unwarranted intrusion. There are too many omissions. The index does not contain Wilson's disease, the lenticular syndrome, and in pathological sleep conditions the hook-worm is not mentioned. The whole lipomatosis question is inadequately treated. The half-hearted description of psycho-analysis and the Freudian concept is a bit irritating, especially when the reviewer is conscious that Dana, with his philosophical point of view, could have written on this subject in a very helpful and illuminating way.

The textbook seems to lack personality and spirit, and its author is rich in both. Why does this book lack a certain vividness, a more abundant vitality, and why does not the reviewer grow to like it? The only answer to this question seems to be that a book that has gone through eight editions has established, perhaps, in the author's mind, that it is that kind of book which he is called upon to write and re-edit from edition to edition. Perhaps, too, the author is not called upon to put enough of himself in this book, thinking that that will be brought into too much conflict with textbook traditions, which perhaps were crystallized at the period when students or practitioners were not expected to get out of a book more than the facts contained in its pages.

**WISHPFULFILLMENT AND SYMBOLISM IN FAIRY TALES.** By Dr. Franz Ricklin, of Zurich. Authorized translation by Dr. Wm. A. White, of Washington, D. C. New York: Nervous and Mental Disease Publishing Company. 1915. Price, \$1.00.

There are many angles from which to view the Freudian psychology, and there are many sources that prove attractive to the investigator in the search for additional evidence in support of its truth.

Ricklin finds in fairy tales a rich field in which to test out the wishfulfilment



and sexuality theories, which are so important a part of Freudian structure. Freud has himself called attention to the intimate relation existing in the world of dreams, hysteria, and mental disease.

A good deal of philological, historical, and anthropological knowledge is necessary to make an investigation of this sort effective, and Ricklin had to acquire some of these things first—a rather formidable task, one would imagine, for a neurologist whose training has been on different lines entirely.

Fairy tales are intimations of the directly utilized, immediately conceived experiences of the primitive human soul and the general human tendency to wishfulfilment. This notion brings the fairy tale well within the scope of logical inquiry of the Freudian investigator.

Ricklin's method is simple. He narrates a certain number of fairy tales taken from the Russian, German, and Norse sources, in the same way as a dream is analyzed in the ordinary psycho-analytic procedure. He translates the symbols and interprets the tale on the theory of its wishfulfilment. All this makes a fascinating and charming study, for there is something about fairy tales which lends itself to delicate and, one would say, fanciful interpretation. Ricklin proves himself very apt at this sort of thing.

There is a distinct literary quality to this monograph, some of which is undoubtedly lost in the translation, which seems to be at times a bit hard and stiff.

To anyone at all interested in the Freudian literature, Ricklin's work should prove most logical, and to those whose early memories are filled with fairy tales of Grimm and Andersen, this work will be most interesting, even if at the end of it he is not convinced that the tales of his nursery time were the wishfulfilment of primitive races, and that the symbolic language in which they were told are in origin sexual.

**TEXTBOOK ON NERVOUS DISEASES.** By G. Aschaffenburg, Cologne; H. Curschmann, Mayence; R. Finkelnburg, Bonn; R. Gaupp, Tuebingen; C. Hirsch, Goettingen; Fr. Jamin, Erlangen; J. Ibrahim, Munich; Fedor Krause, Berlin; M. Lewandowsky, Berlin; H. Liepmann, Berlin; L. R. Mueller, Augsburg; H. Schlesinger, Vienna; S. Schoenborn, Heidelberg; H. Starck, Karlsruhe; H. Steinert, Leipzig; Charles W. Burr, Philadelphia. Authorized English Edition Edited by Charles W. Burr, B. S., M. D., Professor of Mental Diseases in the University of Pennsylvania, etc. etc. With 156 Text Illustrations, Volume I. 90 Text Illustrations, Volume II. Philadelphia: P. Blakiston's Son and Company. 1915. Price, \$12.00.

This book is a translation of articles written by well-known German neurologists, and collected by Curschmann and fashioned into a treatise on nervous diseases. No date is given, but the impression remains that most of these articles are somewhat ancient. Fröhlich's paper, for example, is referred to as a very recent one. Wilson's disease, and the thalamic syndrome of Head and Holmes are not mentioned. All the work on the pituitary by non-German investigators of the past four or five years is unnoticed; and Cushing's name does not appear, nor any of the English neurologists who have made active contributions to the progress of neurology for the past ten years. The only foreign names met with are Charcot, Déjerine and Marie.

The insularity of this book is striking, and if it did not impress the reviewer as being 'ancient stuff' he might think it was a war-time product.

A chapter on Neuroses is added by the American editor. This is chiefly a restatement of the older Philadelphia attitude, and harks back to the old rest cure methods of Weir-Mitchell. With the best intentions in the world the editor can see no progress from that date to this.

Burr's attitude to the Freudian doctrine may well be antagonistic, but no textbook on nervous diseases at the present time is complete without at least a fair statement on this subject. To ignore almost completely the work of many sincere students of neurology, who see in the Freudian psychology a contribution and an important one to our knowledge of neurosis, is in keeping with the general insularity of the whole book. Enough has been said to signify the reviewer's opinion of Curschmann's neurology.

A mystery still remains to be explained—why was this book translated into English, and what delusion of a need of this kind of a book moved the publisher to have it done and printed when it was done. The reviewer has no explanation to offer.

**THE CRIMINAL IMBECILE.** An Analysis of Three Remarkable Murder Cases. By Henry Herbert Goddard, Director of Department of Research, Vineland Training School, New York: The Macmillan Company. 1915. Price, \$1.50.

In this book Goddard relates, in a critical way, the story of three murder trials, which he regards as typical of a large proportion of criminal cases of this kind. The first is a criminal imbecile of high grade, the second shows the effect of suggestion upon a defective mind, and the third shows the crude brutality of the low-grade defective. In all these cases the grade of defect was determined by the Binet-Simon test, or rather Goddard's modification of it. That the court in all three instances admitted such tests as creditable evidence is of interest and importance. This, according to the author, is the first time the court has so ruled.

The cases are interesting as murder stories go, and the story is told clearly and readably. The critical remarks of the author add a good deal of value to the book.

The appendix contains a review of the hypothetical questions and answers in each of the cases. This is dreary reading, as all such questions are likely to be under the present rules.

In various comments on these cases, Goddard points out the crudeness of our present criminal procedures and the lack of recognition on the part of our courts of the advance which has been made in the knowledge of mental deficiency in relation to crime. He points out in a striking way that all three of the individuals of whom he writes should have been wards of the state long before the opportunity of committing murder was given to them. The insistence of prophylactic guarding of society from such individuals is by far the most valuable thing in this book. Murders and murder trials have so frequently been the subject of literary endeavor that if it were not for the broad social attitude of the author, the book would be only of conventional importance.

The style is definite and clear and not nearly as polemical as might be expected. Goddard has his indignation well in hand, and consequently the book has a kind of force which is a bit surprising.

**VAGOTONIA.** A Clinical Study in Vegetative Neurology. By Dr. Hans Eppinger and Dr. Leo Hess, of Vienna. Authorized Translation by Drs. Walter Max Kraus, A. M., M. D., and Smith Ely Jelliffe, M. D., Ph.D. New York: Nervous and Mental Disease Publishing Company. 1915. Price, \$1.00.

This is a monograph that is full of promise and future possibilities. The meagre facts concerning the autonomic and sympathetic systems are set down, and there follow theories, explanations, and hopes for future realization.

Vagotonia is regarded as an increase in tonus of the vagus autonomic system, and is a purely functional condition. The increased tonus of the sympathetic system—sympatheticotonic—is the opposite. In this way is established the physiological antagonism of the two systems.

It is upon the abnormal reaction to drugs, such as adrenalin, pilocarpine, and atropine, that the diagnosis can be based. The assumption is that such drugs are crude products representing the effect of naturally produced hormones. The theoretical assumed vagotonia, or sympatheticotonin, is secreted and thrown into the circulation.

There is little of dogmatism to be found in this book. The authors put forward their views and observations with modesty and attempt to support them by citations from the literature, which has now grown amazingly.

The outlook for which this book is a good preparation is fascinating, and who can tell but that here is the beginning of the real understanding of visceral neurology and of many of the neuroses associated with cardiovascular anomalies.

The translation is very well done, and again we must express our gratitude to the *Journal of Nervous and Mental Diseases* for giving us something on vagotonia in such an attractive form.

**ANATOMY OF THE BRAIN AND SPINAL CORD.** With Special Reference to Mechanism and Function. For Students and Practitioners. By Harris E. Santee, A. M., M. D., Ph.D., Professor of Nervous Anatomy in Chicago College of Medicine and Surgery, etc. etc. Fifth Edition, Revised and Enlarged, with 158 Illustrations, 46 of which are Printed in Colors. Philadelphia: P. Blakiston's Son and Co. 1915. Price, \$4.00.

This is a good anatomy of the nervous system, handy to have about and

easy to look things up in. There are many very good illustrations and some original drawings, which are rather puzzling and a bit crude. Figs. 40 and 41 are diagrams of the internal capsule done in colors. These are ingenious after sufficient study has been given to them. This, however, is not what diagrams are for. Some of the others are very neat, especially those of cross sections of the pontine region and the medulla, which are done in colors. The descriptions are terse and for the most part clear.

Apparently this is a teaching manual, especially suited for the student in following lectures and to use in dissecting the nervous system; used in this way the illustrations must be of great value.

There is a certain friendliness in this book which is difficult to describe, but which makes of it an agreeable companion to have lying on the table. The reviewer is free to admit that the aid given him by this book, in his attempt to understand the puzzling features of the topography of the lenticular nucleus, makes him too grateful a reader for the neutral attitude of the reviewer. As this book aided him, it will in all likelihood be a help to many others.

**A. TEXTBOOK OF SURGERY.** By George Emerson Brewer, A. M., M. D., Professor of Surgery at the College of Physicians and Surgeons, Columbia University, New York; Surgical Director of the Presbyterian Hospital, etc., Assisted by Adrian U. S. Lambert, M. D., Associate Professor of Surgery, College of Physicians and Surgeons, Columbia University; Attending Surgeon to the Presbyterian Hospital, and by Members of the Surgical Teaching Staff of Columbia University. Third and Enlarged Edition, Thoroughly Revised and Rewritten. Lea and Febiger. Philadelphia and New York. 1915.

This third and enlarged edition is the product of the joint labors of Dr. Brewer and a dozen or more collaborators from the Surgical Teaching Staff of Columbia University. One is not quite convinced after a survey of the book that the result is altogether satisfying, for while it possesses completeness and accuracy, it lacks an attribute probably more essential—namely, the impress of individualism. We have contended that the multiplicity of surgical textbooks was excusable on the basis of their variation in the personal viewpoint of their respective authors. When the appeal of personality is completely lost in the extensive collaboration (as it has in this instance), and when the revision fails to include some of the latest developments, we fail to see on what grounds another edition is deemed necessary.

The chapter grouping and general arrangement throughout conforms to the usual conventional order. It will probably prove of more service to those students who come under the teaching of the staff responsible for its authorship, than to any others.

**MANUAL OF SURGERY.** By Alexis Thomson, F. R. C. S. Ed., Professor of Surgery, University of Edinburgh, and Alexander Miles, F. R. C. S. Ed., Surgeon Edinburgh Royal Infirmary. Volume First—General Surgery. Fifth Edition Revised and Enlarged with 289 Illustrations. Volume Second—Regional Surgery. Fifth Edition Revised and Enlarged, with 301 Illustrations. New York: Oxford University Press. 1915. Price, \$3.50 per volume.

Although not at all bulky in size, these two volumes contain a wealth of material between their covers. The English book makers set a mark which our own would do well to strive after. We have not seen from an American press a book of 950 pages in so compact a form, nor any small book so well printed and illustrated. Although the work professes to be only a manual of surgery, we find much information which seldom appears in our larger works. Volume I takes up General Surgery, and Volume II Regional Surgery. The second volume is particularly excellent, showing on the part of the authors not only a familiarity with the literature, but a wide clinical experience as well. In fact, the emphasis laid upon clinical manifestations, clinical varieties, and clinical classifications of surgical diseases is the feature which gives its peculiar superiority. A few English idioms have crept in which add to rather than detract from the general delightful qualities of excellence. A fifth edition is doubtless richly deserved, and we await with the zest of anticipation Volume III which is going to take up Operative Surgery.

**HABITS THAT HANDICAP.** The Menace of Opium, Alcohol, and Tobacco, and the Remedy. By Charles B. Towns. New York: The Century Company. 1915. Price, \$1.20.

This is a curious book, which the medical reviewer takes up with some un-



certainly, especially if that reviewer has used the Towns' treatment and cannot share the enthusiastic praise which is so generously given in the introductory note written by Richard Cabot.

As he reads on, however, he is less perturbed because he soon realizes that this book is less a treatise on methods of treating drug addiction than it is a consideration of the general economic and sociological questions collected about drug habits. Towns is on safe ground when he writes about the danger of the drug habit, the drug taker and the physician, psychology of habits, help for the hard drinker—to name only a few of the thirteen chapters.

There is a lot of personal experience in this book, set down with a good deal of sympathetic understanding, and many of the comments of the author reveal a surprising insight into the soul of the drug habitué. Nowhere, perhaps, can the reader get closer to the personal side of the individual who has become obsessed by the need of a certain drug to satisfy the insistent demands of his organism for that drug than in this book.

Towns is naturally uninformed concerning certain medical facts of the effect of habit-forming drugs. His stricture on tobacco, especially its social and economic tragedies, is rather startling, especially to one who is in the habit of writing his reviews while smoking a pipe.

**THE WORK OF OUR HANDS.** A Study of Occupations for Invalids. By Herbert J. Hall, M. D., and Mertice M. C. Buck. New York: Moffat, Yard and Company. 1915. Price, \$1.50.

This is an interesting book on a subject that every physician should know something about. Dr. Hall has experimented in his place at Marblehead with various kinds of work and the adaptability of different sorts of manual labor for patients, particularly of the nervous type. His success is the proof of the efficiency of his methods and the soundness of his theories.

Work for the handicapped is a vital question, especially at the present time when the war has rendered so many thousands of men incapable of following their former trades.

There is a great deal of spirit in this book, a lot of optimism, and it is filled with the personality of the author.

Work is not a new subject in its medical aspect. The work cure has had many advocates; not a few have written about it; but none in quite so simple and thoughtful a way.

"The Work of Our Hands" is just the story of a physician's effort to help sick people in a practical way, and he tells about it in just the way a man should, who has done a good thing and wants others to have the benefit of his knowledge and experience.

**PRACTICAL CYSTOSCOPY AND THE DIAGNOSIS OF SURGICAL DISEASES OF THE KIDNEYS AND URINARY BLADDER.** By Paul M. Pilcher, A. M., M. D., Consulting Surgeon to the Eastern Long Island Hospital, etc. etc. Second Edition, Thoroughly Revised with 299 Illustrations, 29 in Colors. Philadelphia: W. B. Saunders Company. 1915. Price, \$6.00.

Medical literature of the past few years has recorded many improvements in the technique of pyelography and in the interpretation of radiographic pictures and of cystoscopic findings for the diagnosis of renal diseases. The methods of the tests of functional activity of the kidneys have been further developed. Entirely new cystoscopes have been devised to enable operative procedures in the bladder. An exact record of all these latest advances in our knowledge can be found in this thoroughly revised second edition of a most valuable work. Familiarity with the use of the cystoscope to-day is not only required by certain specialists, but would seem indispensable for the practitioner who, under certain circumstances, cannot avail himself of the aid of a consultant. The mere technique of introducing the cystoscope is easily acquired; and a splendidly illustrated volume like this will make possible the proper interpretation of the findings.

**MANUAL OF EMBRYOLOGY.** By A. Melville Patterson, M. D., F. R. C. S., Professor of Anatomy in the University of Liverpool, etc. etc. New York: Oxford University Press. 1915. Price, \$2.75.

Although elementary in purpose, being for the most part an amplification of lectures and demonstrations given to medical students, this little volume presents in an admirably lucid fashion the essentials of embryology. The book is made up of two parts: the first considering embryology in a general manner, while the second portion deals in a more specific way with organogeny.

It is most excellently illustrated throughout with diagrams and schematic drawings. Perhaps the only shortcoming is the failure fully to correlate embryology with practical medicine and surgery. This is not a unique defect, however, but one universally observed in books of this type. Writers of textbooks generally have not yet mastered the art of avoiding the attitude of scientific abstraction. Nevertheless, we commend with genuine heartiness this "Manual of Embryology," and trust that it receives as gracious a reception from students of the subject as it really deserves.

**CASE HISTORIES IN DISEASES OF WOMEN.** Including Abnormalities of Pregnancy, Labor, and Puerperium. A Clinical Study of Pathological Conditions Characteristic of the Five Periods of Woman's Life. By Charles M. Green, A. B., M. D., Professor of Obstetrics and Gynecology in Harvard University, etc. etc. With 11 full-page plates, one cut and 25 charts in the text. Boston: W. M. Leonard. 1915. Price, \$4.00.

**CASE HISTORIES IN OBSTETRICS.** Groups of Cases Illustrating the Fundamental Problems which arise in Obstetrics. By Robert L. DeNormandie, A. B., M. D., Assistant in Obstetrics, Harvard Medical School, etc. etc. Boston: W. M. Leonard. 1914. Price, \$4.00.

Conferences on the clinical reports of cases observed in the ward or dispensary to-day form an important part in the teaching practically of every branch of medicine. Therefore, volumes like the two before us, covering thoroughly at least all the important questions of obstetrics and gynecology, are not only of great help to the teacher who does not control a large material (the rule and not the exception just in these particular branches), but necessarily must make interesting reading to the student. In a rather attractive and vivid form he is enabled to acquire information concerning the symptomatology, diagnosis and treatment of disease. Of course, one familiar with medical literature cannot help comparing such works, with "Das geburtshilfliche Seminar" by Lippmann, published in 1910, undeniably the pattern after which these newer volumes are modeled,—and such comparison is rather in favor of the originators of this type of textbook.

**EXERCISE IN EDUCATION AND MEDICINE.** By R. Tait McKenzie, B. A., M. D., Professor of Physical Education and Director of the Department, University of Pennsylvania, etc. etc. Second Edition, Thoroughly Revised. With 478 Illustrations. Philadelphia: W. B. Saunders Company. 1915. Price, \$4.00.

The writer does not exaggerate when he calls exercise the Cinderella of the physician's therapeutic family. Few methods of treatment are more potent for good or harm than well- or ill-regulated exercise. The neglect of this therapeutic agent by the average American practitioner is largely due to ignorance, which it is the aim of this critical and well-balanced survey to dispel. The application of exercise in its various forms to each of a considerable number of ailments is discussed in detail in the second half of this volume, the first being devoted to a presentation of the place of gymnastics in education. The writer is no follower of any cult, but presents the subject in a truly rational manner.

**A TEXTBOOK OF CHEMISTRY AND CHEMICAL URANALYSIS FOR NURSES.** By Harold L. Amoss, S. B., S. M., M. D., Dr. P. H., Formerly Chemist, Hygienic Laboratory, United States Public Health Service, etc. etc. Philadelphia: Lea and Febiger. 1915.

This seems to us a gross example of the perfectly needless book. Granted that the nurse should know something of chemistry, as that silver salts are precipitated by chlorides and starches hydrolized into sugars, it is absurd to expect her to memorize or even to read chapters on fluorine, lead, silver, platinum, etc. The following paragraph, selected almost at random, is alone enough to condemn the book as a textbook for nurses:—

"Fats are hydrolized by superheated steam, forming glycerine and an organic acid. One molecule of glycerine (a tri-atomic alcohol) is combined with three molecules of some fatty acid to form fat. In the process three molecules of water are lost. In the hydrolysis these three molecules of water must be supplied."

AMNESIA AND ANALGESIA IN PARTURITION (TWILIGHT SLEEP). By Alfred M. Hellman, B. A., M. D., F. A. C. S., Adjunct Attending Gynecologist and Obstetrician Lebanon Hospital, etc. etc. New York: Paul B. Hoeber. 1915. Price, \$1.50.

In the flood of all the sensational books on twilight sleep the profession will welcome this scientific and sane presentation of the problem of amnesia and anesthesia in parturition. Much harm has been done by the loud and fakish exploitation of 'twilight sleep.' The hysteric but futile attempt of a few fanatics to force the profession of this country into the general adoption of a decidedly hazardous method of general anesthesia probably is responsible for the fact that many physicians have overlooked the few advantageous features of scopolamine-narcophine administration in well-selected cases. We can only hope that this new contribution will encourage expert obstetricians to continue their old endeavors to relieve the pain of labor by methods which in no manner jeopardize either mother or child.

YOUR BABY. A Guide for Young Mothers. By Edith B. Lowry, M. D., Author of "Herself," etc. etc. Chicago: Forbes and Company. 1915. Price, \$1.00.

To write a book of this sort the author must possess not only the necessary information, but also the rare skill of presenting medical subjects correctly in a language easily understood by the layman. In previous books Lowry has proved the possession of this somewhat uncommon gift. Among the many volumes dealing with the same subject, this new work will easily be able to obtain a place among the best of them. Nevertheless, it has its shortcomings, though they are not very important. Here and there the writer's advice is quite out of place for the layman, as, for example, in the chapter on the methods of dealing with the asphyxiated child. However, defects of this sort are outweighed by a clear presentation of the twilight-sleep question, or by short and truth-bearing sentences like "The baby never should be weaned by the advice of neighbors."

POTTER'S COMPEND OF HUMAN ANATOMY. Revised by D. Gregg Metheny, M. D., L. R. C. P. and S. (Edin.), L. F. P. S. (Glasgow), Associate in Anatomy, Jefferson Medical College, Philadelphia. Eighth Edition. With 139 Illustrations; Also Numerous Tables and 16 Plates of the Arteries and Nerves. Philadelphia: P. Blakiston's Son and Co. 1915. Price, \$1.00.

We have fancied that with longer courses of study, more preliminary preparation and better arranged curricula, the modern medical student would scarce have need to resort to the once popular quiz-compend. Perhaps the wish was father to the thought, after all, for publishers still produce them as of old. The revision of Potter's "Compend of Human Anatomy" requires no extensive comment. The subject matter, of course, remains unchanged. The nomenclature has been revised to correspond with that of the larger modern textbooks.

THE PRACTICAL MEDICINE SERIES. Volume VII—OBSTETRICS. Edited by Joseph B. DeLee, A. M., M. D., Professor of Obstetrics, Northwestern University Medical School. With the Collaboration of Herbert M. Stowe, M. D. Chicago: The Year Book Publishers. 1915. Price, \$1.35.

This little volume does not represent simply a mass of abstracts made from the world's literature in the special fields of obstetrics and gynecology. It is a coherent and interesting record of progress in these fields, rendered readable and instructive by the careful selection of the discussed papers, by their systematic arrangement, and above all by the numerous critical annotations of the editor of the volume, a recognized authority in these special branches of medicine. A review of literature given in this form does not only, of necessity, prove valuable to the practitioner, but contains many references to noteworthy contributions in foreign languages, that are not readily accessible even to the specialist.

MEDICAL HINTS. For the Use of Medical Officers Temporarily Employed with Troops. By J. Edward Squire, M. D. (Lond.), F. R. C. P., D. P. H. (Camb.), Companion of the Order of the Bath, etc. etc. New York: Oxford University Press. 1915. Price, \$1.00.

The title of this book is self-explanatory. It contains a brief summary of those diseases and ailments to which troops in service are especially liable.



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## EDITORIAL.

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### THE PREVENTION OF BALDNESS.

Now that we have told the public how to keep their backs straight by assuming the proper position when writing, or reading, or walking, how to expand the chest by deep breathing and how to contract the waist measurement by forward and backward movements of the upper part of the body directly in front of that greatest of all flatterers—the mirror, it behooves us, before we lay down our weapons on behalf of the uninstructed public, to tell them how it is possible for them to keep the shock of hair, which Nature so kindly and luxuriantly places on top of the heads of simpleton and genius alike, in its primal state despite the machinations of dermatologists with hair tonics, hair pomades, hair washes and the blighting storms and stresses incidental to the emotional life peculiar to the majority of mankind in their desire to be outstanding individuals. We feel this our duty; not our greatest duty by any means, but one we should no longer withhold from the public now that we have converted them from puny beings of misdirected appetites into stalwart beings whose physical ‘preparedness’ would affright a race of Vikings were they foolish enough to invade our shores. And that we are not alone in this desire, is attested by the essay which appears in the February issue of the *American Magazine* and which bears the title “Why Men Are Bald,” and has for its author no less a man in the medical world than Dr. Arthur R. Reynolds, former Commissioner of Health in Chicago. Verily, the times are ripe to do for the hair what we have done for the body; and surely we would be poltroons and neglectful of our duties to mankind and all future eugenical children were we to twiddle our

thumbs in a slumberous philosophical way and say baldness is inevitable.

What original thought does Dr. Reynolds bring to bear on the subject, and as a preserver of hair what new and complicated, or new and simple, means does he advance to combat the stubborn persistence of hair to forsake the head long before it should? Dermatologists in the past have talked to us unceasingly about the evils of seborrhea, and have pacified our uneasiness at the prospect of losing the greater part of our hair in the course of not too many months, by giving us preparations to uproot this evil. With what success the many attacks against seborrhea have been attended, is quite difficult to state statistically, since no one dermatologist has ever had the temerity to publish such interesting data. But the number of men whom we meet in the deplorable state of partial or complete baldness would indicate that seborrhea, even though successfully combated for a time, or for that matter cured beyond the slightest return, leaves in its trail a something that is just as harmful to the roots of the hair as was the original disease. Of this opinion is no doubt Dr. Reynolds; and being an earnest investigator on the part of mankind and most desirous to help the public to a better understanding of this somewhat obscure chapter in preventive medicine, he formulates the theory that if we would discard hats altogether, the hair covering our heads would not desert us as is its wont to-day, for with the pressure from the hat band removed, its amiability and tractability would be restored, and it would no longer regard man as an ungrateful host who delights in making its sojourn extremely uncomfortable by cutting off the blood supply absolutely necessary for its existence.

A hatless community attending to its vocations and avocations would be a novel sight, indeed. We have often remarked, and no doubt have others, the isolated cases of hatless men in our streets in summer, who in the hope of preserving their hair or increasing its growth, have faced the withering criticism of their friends without any emotion, so cocksure were they that they were in the right. In their glorious conceit, in their detachment from the habits of the masses, were they the scientific (?) harbingers of a universal innovation, or were they only victims of a fixed idea that straw hats were unhygienic? Taking for granted it was the latter motive, we must criticize them most severely on the ground of being unscientific, for it is not the straw hat that is the worst offender but the 'Derby,' since the band inside the latter fits more snugly around the head than does the band inside the former. And yet if we observe the forerunners of the movement to make the

present generation hatless, it will be noted that it is only in summer that they give a thought to their hair!

"How does the hat affect the growth of hair in man? By compressing the arteries, the veins, the lymphatics, and to some extent the nerves that supply and nourish the hair. It is not because the hat is hard or soft or that it keeps the head too hot. It is because the hat band compresses the vessels and starves the roots of the hair," writes Dr. Reynolds; and fully agreeing with him, would it not be better, instead of walking the streets in winter without hats, to tear at once the bands out of our hats? This is a very simple procedure; in fact can be done by some with considerable ease and without much sacrifice, since very few of us have healthy looking or perfect hat bands after some months' wear. But before this iconoclastic movement is effected, would it not be well to try on our sisters' hats or those belonging to our wives, and if found becoming wear them despite what a critical and sneering public might say? If we have read the weighty words of Dr. Reynolds' essay aright, he states quite positively that women are never bald, for the reason that though their hats may have considerable weight, the objectionable hat band is always lacking. And while some obdurate persons might be firm against discarding the male head-gear and assuming the female head-gear until statistics showing the nefarious qualities of the hat band are published and vouched for by a great authority, the bit of reasoning we are about to advance must convince them before long how wise we are against Dr. Reynolds' unwisdom, in that unlike him we are prescribing for men a head-gear that will have none of the abominations and destructive qualities of the hats they are wearing at present, whereas he can only advocate no hats, thereby showing a decided revolutionary spirit and at the same time incurring the displeasure of hat makers and the long suffering public alike.

P. S.

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#### LITERARY NOTES.

To be critical in a literary sense opposite a book as carefully compiled as is "An Autobiography" by Edward Livingston Trudeau (Doubleday, Page and Company, Garden City, New York) would be carrying things too far or rather expecting too much from one who was not a trained writer. Autobiographies, as a rule, are not the success they are generally heralded to be by their authors, for though they all set out with the high purpose of a promise to "draw the soul" (this quotation is from the Foreword of the book under consideration), the dissection of the soul is invariably lacking.



Sometimes this is due to excessive modesty, as in Dr. Trudeau's case; sometimes to excessive egotism. Be it one or the other, an autobiography is generally a garbled version of one's true emotions, one's true ambitions, and one's real failures. Dr. Trudeau having been a very modest man, holds himself in check; and the result is that instead of a pen picture of the personality that was strong enough to overcome many obstacles (he went to Saranac Lake in search of health when that place was practically unknown and had all the drawbacks incident to primitiveness), we get long and quite uninteresting descriptions of family matters, of people who are not the sort who could hold our interest for any length of time, of incidents that are peculiar to every householder, hence not peculiar at all. We learn that if it had not been for friends interested in Dr. Trudeau's movement to build a sanitarium at Saranac Lake, the fruition of this desire would not have taken place,—and we weary somewhat of their kindness; we learn that Dr. Trudeau's sorrows were many (he lost a son and daughter when both were on the threshold of manhood and womanhood); we learn that in the face of trials it is best to bow the head and take the bludgeonings of fate in a meek spirit. All this has some interest for all; but it does not bring us closer to Dr. Trudeau, it does not by any means give us his portrait with its crudenesses and graces, its faults and virtues, its enviable qualities and its human defects. Dr. Trudeau's most distinguished patient was Robert Louis Stevenson, and yet he devotes only a short chapter of 6 pages to a description of the Scottish novelist, who stayed at Saranac Lake from October 3rd, 1887, until April 18th, 1888. On p. 228 we read: "Mr. Stevenson and I had many interesting and at times heated discussions by the fireplace in the sitting-room"; and then Stevenson's characteristics are mentioned, but the reader hears nothing more of the "heated discussions"; and the one chance to get in close grips with Dr. Trudeau's personality is destroyed. Surely Stevenson in his Letters published under the title "The United States Again: Winter in the Adirondacks" bared his personality, and stands before us stripped of all the glamor with which the popular mind clothes genius, and is only a suffering, impatient man who realizes more and more that consumption is not curable. But Dr. Trudeau's modesty in regard to telling us about his good qualities, or his fear of letting us get under his skin so as to observe his defects, is ever an obstacle in his autobiography to a clear and precise comprehension of a personality that was well worth while. On the other hand, we find in "The Beloved Physician" by Stephen Chalmers (Houghton, Mifflin Company, Boston) an altogether different presentation of the characteristics of Dr. Trudeau, one that is more human, hence more engaging. Mr. Chalmers' book has only 74 pages against 332 in the autobiography, but in this small compass he gives us a clear-cut photograph of Dr. Trudeau, and considerable artistry in the manner of writing. We take it Mr. Chalmers is a

trained writer, and of a judgment that knows at once what will interest the reader. In a sentence of rare literary charm Mr. Chalmers writes: "It is with a painful sense of incapacity that one approaches the task; yet there is no alternative but to fulfil it. For some reason but dimly comprehended after many years, Dr. Trudeau chose to reveal to the writer a phase of his inner self which he was perhaps compelled to keep hidden more or less from many others, on account of his position, on the one hand, as a kind of Nestor in his profession, and, on the other, as physician-confessor to the sick. Like the captain of a ship, he was much alone amid his great company; only with some odd passenger, in whose tastes he found an echo of some of his own that he must ordinarily suppress, could he reveal the more vague views of his heart and mind; for he was not even to those who held him in highest esteem, a demi-god, not all a hero. . . ." Here is the key to the many excellencies of a book that bears on every page distinctive marks of having been written by one whose literary craftsmanship and sound judgment are admirable qualities.

P. S.

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Humor is so often lacking in books and in people, that when we do meet a person who has the precious gift or find it in a book, our praise should be unstinted. Of course, when we referred just now to humor it was not to the sort one sees daily in the newspapers, but to the sort which is of a much rarer quality and can be found only in the ballads and librettos of Gilbert, the pages of "Alice's Adventures in Wonderland" and "Through the Looking Glass," and in Mr. Dooley's books. Stephen Leacock, in his recent book "Moonbeams From the Larger Lunacy" (John Lane Company, New York), again shows why he should be included in the choice company we have mentioned, and why his books, with the possible exception of "Arcadian Adventures With the Idle Rich," should be read by all those whose discernment stands them in good stead in drawing the line between humor like that found in our rather sad comic weeklies and the comic corners of our newspapers, and humor that will live at least for a few years. The whole book under consideration is of a high order, but the high water-mark of delicious writing is reached in "Spoof," a burlesque of the fashionable novel of Robert W. Chambers, and in "An Interview With General Bernhardt." In these two sketches we have Stephen Leacock at his best, for his best is always when he writes with a degree of exaggeration that yet contains many truths. He did this to perfection in "Nonsense Novels," and also in "Behind the Beyond"; and he is to be congratulated for repeating in the present volume the characteristic which is peculiar to his talent as a writer of humorous sketches and which makes his best work so distinctive a product of his mind. That one so seriously occupied as is Stephen Leacock—he is Professor of Political Economy at McGill University—should be both humorist and scientist should not be at all disquieting to

our scientific men, but should convey to them the lesson that perhaps if they would indulge in a bit of humorous writing now and then, they might be better scientists! The author of "Alice's Adventures in Wonderland" and "Through the Looking Glass" was mathematical lecturer at Christ Church, Oxford; but though he wrote books that the world has acclaimed as the choicest bits of humorous literature in the last fifty years, there is no record that his more serious duties suffered by his excursions into the realm of Nonsense.

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P. S.

"Speaking of Operations" by Irwin S. Cobb (George H. Doran Company, New York) is a recent book that has been favorably commented upon by many physicians on account of its humorous (?) account of Mr. Cobb's experiences whilst undergoing an operation. Some weeks before the book reached our desk, we read the essay in the *Saturday Evening Post*, being driven to the act by the importunities of friends who asseverated that if we missed this masterpiece of humorous literature we would rue the day. What impression the first reading made on us need not be mentioned here, for compulsion even in the matter of reading a masterpiece makes one very prejudicial; and wanting to be fair we again read the essay in book form. The second impression was no better than the first, for again we came across the same platitudes, the same effusiveness, the same effort to be witty, and then fail. Mr. Cobb has no literary graces, and even a writer of humorous prose needs these; and across the page he is forever prancing in a most annoying manner, pointing out this witticism and calling our attention to that bit of wisdom. Spontaneity is lacking; the training of a good writer is absent; and in place of these essential points there are an effusiveness and a cheapening of all the literary canons which are highly irritating. Physicians, as a rule, are poor critics of literature of the better sort; but now that they have repeatedly lauded in our presence this book by Mr. Cobb, we are inclined to think that even the most ephemeral literature makes a special appeal to them only when they can find the old anecdotes and the old way of saying things so that no effort is required on their part to think. "This is the funniest book we know of," say the publishers; to which we can only reply in the manner of Mme. Roland with a slight variation of her famous saying: "O Humor, how many crimes are committed in thy name!"

P. S.



# ORIGINAL ARTICLES.

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## THE ALLEN TREATMENT OF DIABETES.\*

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By JULIUS FRIEDENWALD, M. D., of Baltimore,  
Professor of Gastroenterology, University of Maryland, School of Medicine, and  
College of Physicians and Surgeons,

AND

LOUIE LIMBAUGH, M. D., of Baltimore,  
Resident Physician, Union Protestant Infirmary, Baltimore.

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The method of treatment of diabetes first devised by Allen presents a great advance in the therapy of this disease. This plan of treatment is based entirely upon the knowledge acquired by laboratory investigation, and thus presents further evidence of the value of scientific experimentation in the development of clinical medicine and therapeutics.

Allen has shown that by a partial removal of the pancreas with a preservation of the pancreatic duct so as to avoid atrophy of the remaining portion of the pancreas, a condition can be produced which most satisfactorily resembles that observed in ordinary diabetes as seen in the human being. According to the degree of destruction of the pancreas, the intensity of the disease can be made to vary from the mildest to the most severe type.

It would take us too far to discuss in detail the various theories relating to the causation of diabetes, but a few remarks might not be out of place in order to make clear the basis for this special plan of treatment.

It is generally admitted by most observers that there is present in diabetes an inability to utilize carbohydrates, and that the pancreas in some manner controls the utilization of the sugar by the tissues. Diabetes is therefore brought about as a result of a weakness of the internal secretion of the pancreas. According to Allen there may be a marked destruction of the pancreatic tissue, but in the largest proportion of cases, however, there is only a disturbed function "which can be broken down by overstrain or strengthened by rest." Allen says "for practical purposes we may well keep to the simple idea mentioned above, that diabetes is merely the

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\*Presented at the meeting of the Baltimore City Medical Society, January 7th, 1916.

weakness of a bodily function—namely, the function of assimilating certain foods. It may be compared with indigestion. A weak stomach may never become a strong stomach, but there is no cause for death unless the patient abuses the weak organs. The possibility and perhaps the probability exists that a weak pancreas is something analogous. Every person has his weak points, and ultimately breaks down at some one point, rather than everywhere simultaneously. If a person overtaxes a weak stomach, the resulting distress punishes the error, and forces him to desist. If he overtaxes a weak pancreas, nothing but intelligence can show him what is wrong. If there were no prompt reflex mechanism to prevent and punish overtaking the digestive function, doubtless the death-rate from indigestion would be fully as high as the death-rate from diabetes now is.”

The treatment of diabetes as devised by Allen was first carried out on dogs. It was observed that by destroying a portion of the pancreas, and then producing glycosuria, that this condition could be overcome by fasting and that the animal could then be placed on a diet, which would maintain life without producing glycosuria again. He applied this principle in the treatment of patients affected with diabetes. According to this plan, the patient is kept in bed and fasted until the glycosuria disappears and perhaps for twenty-four to forty-eight hours longer. Water, however, can be taken freely. With the fast the acidosis diminishes and often disappears.\*

Inasmuch as alcohol does not produce glycosuria and has a tendency to decrease acidosis, it may be prescribed during the fast, especially if an acidosis is present. It is especially useful as a food as it does not produce glycosuria. There is no contraindication to the use of the alkalis if coma seems threatening, though even in this condition they are rarely needed. When the patient has been sugar free from twenty-four to forty-eight hours, he is placed on a diet of vegetables containing 5 per cent. of carbohydrates. If sugar should again appear another fast day should be prescribed. The original fast may last from three to eight days, but usually not over four days; after this the fast need not be longer than one day. Starvation is well tolerated, and the patient loses flesh, and according to Allen a moderate loss of weight is of advantage to the patient. There are no contraindications to the fast, except perhaps nausea, vomiting, and great prostration; if these symptoms supervene they can be overcome by feeding, and then after a short period another fast can usually be undertaken without their reappearance. Such complications as carbuncles, beginning gangrene, and

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\*Joslin has recently simplified the fast days by allowing clear meat broth as desired in addition to water, tea and coffee, which renders the fast much less strenuous.

infections are special indications for the employment of this plan of treatment, and are directly overcome by the fasting.

After the urine is sugar free for one or two days, the carbohydrate tolerance of the patient is estimated. Vegetables containing 5 per cent. of carbohydrates are first allowed. In prescribing the dietary the table of Joslin is of the greatest help. At first but 150 grm. of these vegetables should be taken per day. In very severe cases, whenever the green vegetables cannot be tolerated by patients without producing glycosuria, they should be boiled three times with change of water, thus reducing their carbohydrate content nearly a half. The quantity of the 5 per cent. vegetables can be gradually increased to an amount to make 25 grm. of carbohydrate and then gradually up through the 10 per cent., 15 per cent. forms and the 5 per cent. and 10 per cent. fruits and up to the 20 per cent. carbohydrate foods. The carbohydrate tolerance of the patient is estimated daily, and at the first appearance of the slightest trace of glycosuria the patient is again fasted, and the vegetables of the 5 per cent. variety again given, and increased cautiously, but kept below the limit of tolerance. On the day following that on which the vegetables are first allowed (the urine remaining sugar free) the proteids are gradually added, beginning with 20 grm. a day in the form of eggs and meat, and are increased daily until the patient is receiving, according to Joslin, 1.5 grm. of protein per kilogram of body weight. Fats have already been taken in small quantity with the proteids in the eggs and meats, and should be gradually increased. These are best given in the form of butter, cream, and olive oil, but not more than 200 grm. per day should be taken. It is quite as important to estimate the fat tolerance, as that of the carbohydrates and proteids, for while there is no evidence whatsoever that sugar is produced by fats, there is no doubt but that glycosuria is very apt to supervene in severe cases of diabetes on the addition of quantities of fats, such as butter and olive oil. It is probable, according to Allen, that the glycosuria is produced in these cases by the stimulating effect of the fat upon metabolism. Among the facts brought out by the Allen treatment is one of great importance, that is that in order to prevent a return of glycosuria, the diet should be increased gradually from the starvation days, and that the increase in proteids and fats should be regulated just as carefully as the carbohydrates and kept within the limits of tolerance. Rosenblum has also recently shown the importance of restricting the quantity of proteids in order to lessen the excretion of acetone bodies, and a similar conclusion has been held for some time with regard to the fats.

In the event of the reappearance of glycosuria after the increase of the diet, starvation should again be resumed for a day or two until the sugar disappears, and the diet should then be increased



## JOSLIN'S DIET TABLE IN THE TREATMENT OF DIABETES.\*

STRICT DIET. MEATS, FISH, BROTHS, GELATINE, EGGS, BUTTER, OLIVE OIL,  
COFFEE, TEA AND CRACKED COCOA.

Foods Arranged Approximately According to Per Cent. of Carbohydrates.

VEGETABLES.				
5 per cent.		10 per cent.	15 per cent.	20 per cent.
Lettuce	Cauliflower	Onions	Green Peas	Potatoes
Spinach	Tomatoes	Squash	Artichokes	Shell Beans
Sauerkraut	Rhubarb	Turnip	Parsnips	Baked Beans
String Beans	Egg Plant	Carrots	Canned	Green Corn
Celery	Leeks	Okra	Lima Beans	Boiled Rice
Asparagus	Beet Greens	Mushrooms		Boiled
Cucumbers	Water Cress	Beets		Macaroni
Brussels Sprouts	Cabbage			
Sorrel	Radishes			
Endive	Pumpkin			
Dandelions	Kohl-rabi			
Swiss Chard	Broccoli			
Sea Kale	Vegetable			
	Marrow			
FRUITS.				
Ripe Olives (20 per cent. fat)		Lemons	Apples	Plums
Grape Fruit		Oranges	Pears	Bananas
		Cranberries	Apricots	
		Strawberries	Blueberries	
		Blackberries	Cherries	
		Gooseberries	Currants	
		Peaches	Raspberries	
		Pineapple	Huckleberries	
		Watermelon		
NUTS.				
Butternuts		Brazil Nuts	Almonds	Peanuts
Pignolias		Black Walnuts	Walnuts	
			(English)	
		Hickory	Beech Nuts	40 per cent.
		Pecans	Pistachios	Chestnuts
		Filberts	Pinenuts	

MISCELLANEOUS.	Reckon <i>actually</i> available carbohydrates in vegetables of 5 per cent. group as 3 per cent., of 10 per cent. group as 6 per cent.
Unsweetened and unspiced pickles, clams, oysters, scallops, liver, fish roe	

(30 grams 1 oz.) Contain approximately.	Protein grams	Fat grams	Carbohydrates grams	Calories
Oatmeal, dry weight.....	5	2	20	110
Meat (uncooked) .....	6	2	0	40
Meat (cooked) .....	8	3	0	60
Broth .....	0.7	0	0	3
Potato .....	1	0	6	25
Bacon (cooked) .....	5	15	0	155
Cream, 40 per cent.....	1	12	1	120
Cream, 20 per cent.....	1	6	1	60
Milk .....	1	1	2	20
Bread .....	3	0	18	90
Butter .....	0	25	0	240
Egg (one) .....	6	5	0	75
Brazil Nuts .....	5	20	2	210
Orange (one) .....	0	0	10	40
Grape Fruit (one).....	0	0	10	40
Vegetables, 5-10 per cent. groups....	0.5 or 1.5	0	1 or 2	6 or 10
1 gram protein, 4 calories.			1 gram carbohydrate, 4 calories.	
1 gram fat, 9 calories.			1 gram alcohol, 7 calories.	
6.25 grams protein contain 1 gram nitrogen.			1 kilogram = 2.2 pounds.	
30 grams (g) or cubic centimeters (c.c.) =				
1 ounce.				
A patient "at rest" requires 25 to 30 calories per kilogram body weight.				

\*Present-Day Treatment of Diabetes (*American Journal of Medical Sciences*,  
October, 1915).

cautiously. It is also well to prescribe, especially in the severe forms of diabetes, starvation days once a week or once in ten days, while in the milder forms vegetable days will usually suffice. Even though a patient is sugar free it is best not to increase his diet too much; that is, if he is taking 60 grm. of proteids, 40 grm. of carbohydrates and 200 grm. of fat a day, he is consuming quite sufficient food, and these quantities should not be increased.

The following table indicates that such a patient's intake represents about 2,200 calories:—

Food	Quantity in grams	Calories per gram	Total Calories
Proteid .....	60	4	240
Carbohydrates .....	40	4	160
Fats. ....	200	9	1800
			<hr/>
			Total, 2200

The caloric intake is low in many of the diabetic diets, but notwithstanding this the patients usually do well, although they may lose some in weight. According to Allen, an initial loss of flesh need not cause alarm and in fact is of benefit to the patient. After the patient is sugar free there is no objection, however, to a gain in flesh, but this should not exceed the original weight. In severe cases with great loss of flesh in which the carbohydrate and proteid tolerance is low, the balance can be made up by the fats to a certain degree; often as much as 150 grm., and the remainder with alcohol, which is a food which does not produce glycosuria.

In those severe cases with ketonuria, it is well to give the patient soda for the first day or two of the fast period; but it is surprising how quickly this remedy can be lessened and withdrawn without danger and with a disappearance of the acidosis. According to Joslin, it may be advisable to prescribe in a certain number of severe long-standing cases with acidosis a diet of carbohydrates for a few days preceding the initial fast, which will shorten the fasting period and also prevent an acidosis during this time. We have been in the habit for years of advising champagne in this condition, and are confident that it has acted as a specific and a life-saving measure in a number of cases with threatened coma. Whiskey is also of great value in these cases.

The following table indicates the quantity of food that may be taken by a severe case of diabetes:—

Food	Quantity per gram	Calories in grams	Total Calories
Proteids .....	70	4	280
Carbohydrates .....	15	4	60
Fats .....	150	9	1350
Alcohol .....	25	7	175
			<hr/>
			Total, 1865

In other instances in which acidosis first appears after the fast has been instituted, and when the sugar has disappeared from the urine, there need be little fear of threatened coma, for the ketonuria will usually disappear on the addition of the vegetable foods. Alcohol given in frequent but moderate amounts will also tend to overcome this condition.

Allen has also observed that exercise increases the tolerance of patients with diabetes, both for carbohydrates and proteins. In the stronger patients, the initial fast may be shortened by this method, and in other individuals exercise may be begun as soon as the glycosuria and acidosis have subsided. According to Allen, if glycosuria appears after the carbohydrates, proteins and fats have been added to the diet, it is often possible to overcome this condition by exercise while continuing on the same diet. It is especially important to prescribe exercise immediately after meals containing carbohydrates, which have a tendency to induce glycosuria, but exercise can be taken at any time. It is best to encourage short courses of severe exercise with periods of rest, rather than long continuous exercise such as long walks, which may cause fatigue. Allen advises such exercises as running up and down stairs, jumping rope, turning somersaults, and tennis. While fat is being reduced by exercise the muscular tissue is built up, and the "flabby-muscled diabetic is turned into an athlete as far as practicable."

Inasmuch as the diet must be carefully watched even when the patient is no longer under the immediate care of the physician, it will be well to interest the patient in his condition, especially in regard to his food. He is therefore taught to examine his urine for sugar and to make this test two or three times weekly, and is urged to keep a record of the quantity and character of his food. At the slightest appearance of sugar he should report his condition to the physician, and his food must be reduced or a starvation day must again be taken according to the plan already described. An intelligent patient will usually take the keenest interest in his condition, will examine his urine frequently, will watch the quantity and character of the food and assist materially in keeping himself free of sugar and of an acidosis. To those whose experience with this form of treatment is limited, we should like to call attention to the little work of Hill and Eckman which gives a clear, succinct account of the Allen treatment with graduated diet lists that can be easily followed. The tables of Locke can also be utilized to great advantage in calculating food values. Hart's Food Scale is also to be recommended as a most useful and simple apparatus for weighing food, and one which the patient can easily handle himself.

We have thus far treated 20 cases according to the Allen plan. Of these, 3 were severe cases, 10 moderately severe cases, and 7 mild cases. All were rendered sugar free in from one to



four days, and all have been kept free of sugar with the exception of one case, in which the patient has not followed the dietary restrictions. In a very few instances in which sugar reappeared, this condition was easily overcome by a single day's fast. All the patients are in good condition, and are carefully following their dietary regulations.

We do not believe that we can sum up the importance of this plan of treatment better than by quoting from remarks recently made by Joslin: "Fasting and a low diet have been known, but it is only fair to give Allen the credit of (1) seeing the therapeutic significance of inanition upon a severe case of diabetes, (2) proving upon diabetic dogs that prolonged fasting would render them sugar free, and (3) having the courage of his convictions, and applying this principle to human diabetes. Thanks to Dr. Frederick M. Allen we no longer nurse diabetics, we treat them."

## THE IMPOSSIBILITY OF CURING SYPHILIS BY SALVARSAN ALONE AND THE DANGERS ARISING FROM INSUFFICIENT TREATMENT.

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The value of any new treatment of disease must be decided by the crucial test of time.

Especially is this true of salvarsan which was widely heralded as a cure for one of the most dreaded diseases affecting the human race, a disease which was and is widespread among all civilized countries of the world. Because of the way syphilis is acquired, its frequency was unsuspected by the community at large and it was chiefly known to its victims and to the medical profession. Thus it was supposed to exist only among those leading the most immoral lives and was discussed under the breath if mentioned at all.

Suddenly with the advent of salvarsan all was changed. The public press exploited the remedy and the 'black plague' took its proper place beside the 'white plague' as one of the diseases which seriously menaced the public health.

A theatrical manager had the temerity to put upon the stage a play which had syphilis for its subject and it was presented in all large cities. Large audiences rushed to see it, and young and old, innocent and guilty alike attended this public washing of dirty linen.

The advertising bureau of the theatre was quite active in getting the opinion of experts in this line, and their names and comments were prominently presented in the public press and, at the moment, there was no one so popular as the genito-urinary specialist.

While the public was thus receiving its kindergarten education regarding the disease and its remedy, the medical profession was equally active. Medical journals were filled with enthusiastic articles describing its marvelous results, and frequently were illustrated by pictures showing the lesions before and after taking it. Was it any wonder that a remedy which promised so much was gladly welcomed by the medical profession which knew all about the disease, as well as by the public which knew nothing at all about it but was anxious for a quick, sure and easy cure?

To this remedy has been applied the test of experience, and by its effects in numberless thousands of cases we know to-day that sal-

varsan alone does not cure syphilis but must be aided by the older and surer remedies. We do not discard it because it is not a complete cure, but on the contrary value it highly as a most effective agent in our treatment. We know that its effect upon the lesions of the skin and mucous membranes is rapid and marvelous beyond words; that it relieves the severe, secondary, specific headaches like the touch of a magic hand and that after one or two administrations there is a gain in the patient's weight, an improvement in his color, and he feels and looks as well as ever. Because this is so and yet a cure is not accomplished is its greatest source of danger to patients as well as the keenest disappointment to those of us who have used it largely. Even if no visible signs of the disease return, a Wassermann test of the blood often shows a triple or quadruple positive, and we know the disease is still present in an active form.

Unfortunately, we are not always able to convince a patient that he needs further treatment and he drifts away feeling assured that he is as well as ever. To understand how great a menace this is, it may be well to recall the course of the disease before salvarsan was used and the duration of treatment taken by the average patient and to compare it with the present.

In those earlier days when a patient presented himself with an ulcer upon the genitals we treated it with washes and powders as palliatives until the characteristic symptoms of a primary lesion of syphilis appeared. When the ulcer became indurated and the glands in the groin showed painless enlargement we were sure of its nature. Even then it was considered wiser to wait for the secondary rash to be doubly sure of our diagnosis and also to convince the patient that he had constitutional, as well as local, symptoms. If treatment was started at once, these did not appear, and later he might have, and frequently did have, doubts as to whether he really had the disease.

Our diagnosis made, we now informed him of our conclusion.

He was at once panicstricken and horrified to find that he had such a dreadful malady, and his first question was sure to be "can it ever be cured?" Upon our assurance that it could be, but that a cure required a long course of treatment faithfully followed, who was so anxious as he to have us do all we could for him and so very profuse in his promises of obedience to orders!

He was only too anxious to report at the desired intervals and to carry out the directions of his physician as regards abstinence from alcohol, personal hygiene and the regular use of such medicines as were ordered. Under such diligent and faithful co-operation it was not long before evidences of the value of the remedy were to be noted. The secondary eruption soon faded, the induration about the primary lesion softened and gradually disappeared, and the secondary headaches, mucous patches and sore throat were rapidly re-



lieved and the patient was apparently well started on the road to recovery.

There was, however, a marked tendency for the mucous patches upon the lips, tongue and fauces to recur from time to time and these served as excellent reminders that the disease was still present. As a rule, during the whole of the first year of treatment, these lesions would make their appearance at varying intervals, depending upon the habits regarding tobacco and upon individual susceptibility.

At the end of the first year of treatment the patient, seeing few if any symptoms of the disease, was in a much less nervous state and was inclined to question whether after all its seriousness had not been exaggerated or perhaps that he had only a mild case of it. Having feared disfiguring eruptions upon the body or face and noticing only a few white spots in his mouth, it was only natural that he should reason as he did. Having reached this placid and comfortable state of mind, his visits became fewer and at such intervals as suited his convenience and finally stopped altogether until too late for treatment to be of any avail.

Such a case as the following shows to what an extent stupidity and negligence may be carried. A young man of thirty, of excellent business and social position, consulted me many years ago for very marked syphilitic alopecia. He contracted the disease five months before his visit to me, and was treated for two or three months when his physician died and he had taken no treatment since. Meantime his hair began to fall out until two-thirds of a very heavy growth had gone and the baldness was in large patches over the whole scalp. His eyebrows had also nearly all fallen out. To avoid exposing his condition, he determined to take a trip to Bermuda and remain there until his hair and eyebrows grew again, and he was given medicine to last six to eight weeks. Nothing more was heard from him for three years, when he came in with a large ulcer upon his left ankle which was clearly syphilitic. No treatment of any kind had been taken since his previous visit because he had felt perfectly well and his hair had again become abundant and healthy. He came only three times and again disappeared when the ulcer was healed. His brother told me nearly ten years later that he had taken no more treatment and had been married. No children had been born, which was fortunate.

Twenty-eight years' experience in hospital and private practice, with abundant opportunity to observe these cases, has led to this conclusion: That not more than 50 out of every 100 cases in private practice took regular treatment for more than one year and this in spite of the recurring lesions already referred to. In hospital practice not twenty-five out of a hundred followed the treatment as they were told to do. It is therefore not surprising

that our insane asylums are filled with its victims and our almshouses with blind and paralysed wrecks.

During the past ten years we have made wonderful progress in our knowledge of the disease. The discovery of the infecting organism, the *spirocheta pallida* by Schaudinn and Hoffman in 1905; the valuable test of the blood serum by Wassermann in 1906 and by Noguchi a little later, and finally the introduction of salvarsan by Ehrlich in 1910, have been and are great aids to us in our diagnosis and treatment. No longer do we wait for the development of the clinical characteristics of a venereal ulcer to appear, but, as early as possible, we examine the serum from it by dark-field illumination or india ink stain for *spirocheta pallida*; and if this trypanosome is found we at once place the patient under treatment, giving two or three intravenous injections of salvarsan, repeated at such intervals as seem best. The ulcer promptly heals and no secondary symptoms appear. If, as frequently happens, the patient does not consult us until the ulcer is well developed and secondary symptoms are present, under this remedy the rash soon fades, the sore throat begins to improve and the initial lesion very rapidly heals. In short, we accomplish in a few days that which required weeks under our former method of treatment. Naturally, such a change was welcomed by physician and patient, and on all sides this discovery was heralded as marvelous and effective. A new day had apparently dawned in the therapeutics of syphilis, and at last this intractable and dangerous disease was to be cured quickly, easily and safely.

As time went on it became increasingly apparent that this was not to be, for cases began to return to us with recurrence of this disease upon the skin and mucous membranes. Even if no symptoms were present, repeated positive Wassermann tests showed that the disease was still present. Very soberly and thoughtfully, therefore, we relinquished our hopes of an ideal cure from salvarsan and returned to the remedies we had formerly used and combined them with the newer remedy.

While these facts are known to every physician who has seen these cases, it is not easy to convince patients of their truth, for seeing nothing they fear nothing and are therefore unwilling to be called sick when they feel perfectly well.

The greatest curse of syphilis is its latency for it frequently fails to show any sign of its presence upon the skin or mucous membranes which would warn the patient of his danger. Thus hidden and untreated it slowly and insidiously attacks the spinal cord or brain, and its victim, unsuspecting its presence, does not report to us until locomotor ataxia, optic neuritis or paresis is present. It is true that most cases show sooner or later some evidence of its presence upon the skin or in the throat or nose, but these are promptly

recognized and treated. It is also true that far too many remain concealed until serious structural changes have taken place. To avoid these dire calamities it is necessary to make our patients realize these facts.

To illustrate the false impressions which are current among the public regarding the curative value of this remedy, the following conversation which was reported to me is significant. A young man, much agitated by the discovery that he had syphilis, was told "not to mind that but just go to the hospital and get a 'shot' of 606 and he would be all right." "Why," said his adviser, "I had it six months ago and got a couple of 'shots' and am all cured now!"

Because a lie always travels faster than the truth it will be years before we are able to educate our patients of the less intelligent class to pay no attention to such statements as this.

It is not necessary to relate a large number of cases to demonstrate the necessity of more treatment than one or many injections of salvarsan, but the following are especially significant.

A young man of thirty was referred to me by Dr. Patterson and gave me this history. He contracted syphilis in 1911 and was treated at one of our large hospitals and received two injections of salvarsan. A blood test taken a month later was positive and he was given five more injections and no other treatment. Two more blood tests taken within three months were negative and no further treatment was advised. As he was anxious to be married he asked the attending physician if he was in proper condition and was told to marry as soon as he pleased. He was therefore married in January, 1914, and consulted me in May, about four months later. At this time he had a series of mucous patches which covered the inner surface of the lips and the sides of the tongue and extended to the cheeks.

I have never seen a case in the early stages of the disease, even when untreated or poorly treated, present a more extensive series of mucous patches than did this 'cured' patient. He could not persuade his wife to come for examination and I am unable to say whether or not she was infected.

A man and his wife were referred to me by their physician, Dr. Hudson, in October, 1914. She had received six injections of salvarsan and he had been given five at a hospital, and they were told that the blood tests were negative. No further treatment was advised and they were instructed to report in six months for blood tests. Six months after her first visit she developed a severe form of cutaneous syphilis, the lesions being very numerous and tubercular in type and scattered generally over the body. The husband, after five months, developed a severe form of vertigo and headache, which was promptly relieved by large doses of iodides. The eyes and ears were examined and no cause was found for his symptoms.



It was fair, therefore, to conclude that these symptoms were of syphilitic origin.

Another illustrative case was seen in Paris by the writer at the clinic of Professor Thibierge at St. Louis Hospital.

A man of thirty-eight presented himself with a deep ulcer at the tip of the tongue. The tissues had been destroyed over an area the size of a thumbnail and the appearance was that of a typical tertiary lesion of syphilis. It was, however, an early case, for he contracted the disease only nine months before and had received two full doses of salvarsan but had not returned for the intramuscular treatment always used at this clinic. Nothing could show more clearly the impossibility of curing syphilis by salvarsan alone.

These cases have been selected from many similar ones because they were treated by competent physicians at institutions of the highest reputation.

When these relapses take place and the patient reports to his physician, nearly everyone advises a repetition of the previous treatment for each outbreak and sometimes this is carried to unreasonable extremes, as is well shown by the following case which Dr. E. T. Easton kindly permitted me to report.

A woman of thirty consulted him for a severe chorioido-retinitis which had destroyed the sight of one eye and was rapidly progressing in the other eye. For this condition she had received from her physician twenty-one injections of salvarsan and no other treatment whatever. No benefit resulted, but, on the contrary, the condition became steadily worse. Under energetic treatment by mercurial inunction and large doses of iodides, rapid improvement took place and the sight was saved in the good eye. Comment upon such a case is needless.

In repeating the injection of salvarsan the fact must not be forgotten that it is a powerful and sometimes dangerous remedy. It is unreasonable to expect that so large an amount of arsenic can be used without detrimental effects upon the kidneys and other organs if repeated too often or at too short intervals.

Because it is relatively harmless, when used with care and good judgment, is what makes it so valuable an adjunct to our treatment. In a series of more than two thousand injections given by the writer and his assistant the only untoward after-effects that have been observed have been 3 cases of acute nephritis which gradually recovered.

For the reason, then, that recurrences take place after repeated doses of salvarsan and that the Wassermann test remains positive in so large a percentage of cases, we may as well recognize, first as well as last, that something else is required to accomplish a cure and must turn to our older remedies to aid us.

Our experience with salvarsan may also teach us, as a profession,

not to be quite so ready to abandon the old and tried remedies for the new and untried.

To complete the cure, then, we must use the various forms of mercury and iodide of potassium as we did in former days. It is idle to assert, as has been done, that mercury did not cure syphilis, for such a statement is contrary to the experience derived from four hundred years of its use and to the testimony of thousands of trained observers. True, it did not always do it, but neither does salvarsan nor the combination of mercury and salvarsan, for there are cases of the malady so incorrigible and intractable that nothing seems to cure them. Such cases are fortunately rare, but they do occur.

To be sure there was no method of checking the results by examining the blood until within a few years, but the histories of treated cases, which have been watched during their lives, are of the greatest clinical value. These cases, so watched, must have been cured, for thousands of them showed no signs of the disease in later life nor did their wives nor their children.

The intra-muscular method is probably the best way to administer the mercurials. This consists of a weekly injection into the gluteal region of the insoluble salts, of which three are in common use, the salicylate, calomel and grey oil (metallic mercury).

The formula of Colonel Lambkin will be found most satisfactory and this is as follows for the grey oil:—

Hydrarg. Purificat.....	10 grm.
Absolute Creosote	
Camphoric acid.....āā	10 c.cm.
Palmatin basis.....	100 c.cm.
10 minims represent 1 grain of metallic mercury.	

The intravenous use is one of the newer methods and is used when a rapid effect is needed. For this purpose the cyanide of mercury is used in doses of 5 mgrm. to a centigram repeated every other day for twelve times according to the method in use at St. Louis Hospital, Paris. A grain of opium should be given two or three times a day during the treatment, as the action upon the intestinal tract is apt to be severe. The administration of mercury by the mouth has great value and may be the only one practical to use. Inunction and fumigation have each their place.

For a time after the introduction of salvarsan the use of iodide of potassium fell off to a remarkable degree, but it is now coming back and most properly so. Its action upon syphilitic tertiary lesions was hardly less wonderful than that of salvarsan; under its use ulcers of various kinds promptly healed, gummata melted away, periostitis and nodes disappeared and severe cerebral symptoms were promptly relieved.

Surely a remedy of such potency as an adjuvant to our treatment should not be consigned to the therapeutic scrap heap.

By the energetic and persistent use of these three remedies we accomplish a cure of the disease more rapidly than ever before, but we can only do so when we have the earnest co-operation of the patient, and we can obtain this by explaining to him the necessity for them. We must banish from his mind the idea that he is cured because he has had one or many injections of salvarsan, by pointing out to him the inevitable results upon his future health unless he takes further treatment.

To determine a cure we must apply the Wassermann test to his blood and thus ascertain our progress. The spinal fluid should also be examined in order to recognize early any involvement of the nervous system. We must not be satisfied with a single negative result but should repeat the test from time to time.

In practice we recognize the fact that a positive report means, in a large percentage of cases, that syphilis is present but that a negative report does not exclude it absolutely. The test is a very delicate one and may vary even in skilled hands, but it is of the greatest value to us in verifying the results of our treatment, and especially in showing the patients, who have long neglected treatment, that the disease is still present.

I desire to place on record my appreciation of those members of our profession who spend their lives in the laboratories doing work not always appreciated and relatively unpaid in order that we who see the interesting clinical side may treat our patients more scientifically and successfully.

This paper is not intended to add to the scientific knowledge of how syphilis is to be treated; it does not attempt to discuss how many injections of salvarsan shall be given under varying conditions or how many series of intra-muscular injections are to be administered and in what doses, but it is merely a record of the impressions which the writer has received from observing many patients before the advent of salvarsan and since. Its object is to recall certain facts to the minds of those members of the medical profession whose time is too closely occupied with many arduous duties to permit them to follow the rapid changes in our ideas of the best treatment of syphilis.

The facts upon which I desire to place especial emphasis are:—

1. That the majority of patients have always neglected to take proper treatment for this disease because of its apparent mildness.
2. That the use of salvarsan alone does not cure syphilis, but because it apparently does, patients do not return for the needed after-treatment by intra-muscular injection of the mercurials and other valuable remedies.

Because of the apparent simplicity of the cure, and the absence of any external evidence of the disease in many cases, treatment is



now discontinued in a few weeks instead of a year under the older method.

3. That one form of treatment alone must not be used to combat this treacherous disease, but that every known means, old and new, must be made use of to save our patients from future suffering and perhaps death.

Only by the earnest co-operation of physician and patient can a cure be accomplished and careless and neglectful patients saved from the inevitable results of their negligence and folly.

386 Commonwealth Avenue.

## THE RELATION OF THE PATHOLOGICAL BASES OF HYDROCEPHALUS TO ITS SURGICAL ALLEVIATION.\*

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Hydrocephalus is an accumulation of cerebrospinal fluid, in excess of the normal quantity, contained within its normal confines, the communicating system of ventricles (internal hydrocephalus), and the subarachnoid space (external hydrocephalus).

Usually the internal type, the characteristic findings are (1) marked *ventricular dilatation*, especially of the lateral ventricles, perhaps confined to one or more ventricles, and containing cerebrospinal fluid under pressure; (2) pressure destruction or atrophy of the cortex, until this may be a mere shell; (3) an enlargement of the connecting pathways between the ventricles; (4) *soft and anemic brain tissue*; (5) *compression of the central ganglia*; (6) *pressure disturbances in the corona radiata and white matter*; (7) *ependymal thickening and roughening*.

In the infant *unless premature ossification* has taken place there are certain characteristic signs: (1) an *enlarged head*, with a prominent projecting forehead associated with a prominence at the root of the nose; (2) marked disproportions between face and size of head; (3) thinning of the cranial bones; (4) prominent superficial veins; (5) *marked separation of the sutures*, and prominent fontanelles; (6) a vascular murmur on auscultation, thin growth of hair; (7) a drawing upwards of the palpebral aperture so that the *eyes seem displaced downwards*, and are partially covered by the lower lids; (8) *impaired intelligence*; (9) *spasticity and impaired motor functions*; (10) *choked disc* (less often than in the acquired form).

Later in life the safety valve of a soft cranium is lost by ossification and we meet with increased intracranial tension characterized by *choked disc* (most important); vomiting; headache; slowed pulse; high blood-pressure.

These conditions may occur as primary conditions (as the congenital type) usually leading to death from interference with the cerebral functions by pressure atrophy and anemia or, as conditions secondary to *obstructions of the foramina of exit* (meningitic ad-

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\*Excerpt from Address on "The Foundations of Various Cerebral Syndromes and Their Relations to Surgical Intervention." Presented Before the Chattanooga Academy of Medicine, February 26th, 1915.

NOTE.—For simplification the spinal canal and spinal subarachnoid space will, though directly connected with the cerebral system, be ignored.

hesions) or of the *veins of exit* (tumor cerebri). Trauma, lues, tuberculosis, septic meningitis, brain tumor, and chronic alcoholism may be associated with hydrocephalus. Tuberculous meningitis may lead to severe acute hydrocephalus with death, and there are numerous other associated conditions.

The later views of the physiological and pathological disturbances which lead to this condition reasonably coincide. A comprehension of the cause of this accumulation is clearly necessary, unless one should attempt to afford relief on merely empirical grounds.

For our purposes there are several basic anatomical facts to be emphasized. From the primitive medullary tube is developed a communicating system of cavities, situated within the brain substance,

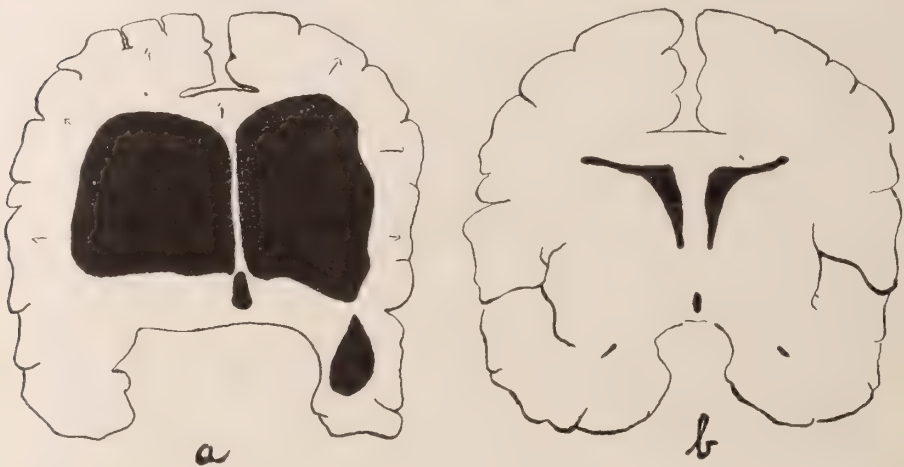


Fig. 1.—(a) Brain section showing distended lateral ventricles (internal hydrocephalus) and the lines of force compressing the basal ganglia, and the cortex. (b) Normal brain section.

the ventricles, directly connecting with the subarachnoid space through foramina (and directly continuous with the spinal canal). This system automatically divides itself into the intracerebral (ventricular) and the extracerebral (subarachnoidal) portion.

Concerning the origin of this fluid, experimental catheterization of the aqueduct of Sylvius, thus isolating the extracerebral system, and blocking off the ventricular system by aleuronaut injections, have shown clearly by the consequent accumulation within the ventricles that cerebrospinal fluid is formed there. This fluid is of extremely low specific gravity, contains but a few morphological elements, faint traces of protein, and dextrose. Evidently, this differs from lymph. The lining (ependyma) of the ventricles is not essentially glandular, being formed by a single layer of cells, derived from the epiblastic layer. In each of the communicating ventricles (the lateral, third, and fourth) however, bodies of highly vascular villi, composed of tortuous capillaries, and covered with differen-



tiated ependymal cells appear. These choroid plexuses have for a long time been considered the actual source of the cerebrospinal fluid. Such hypotheses, by careful experiments, have been given practical weight, since prolonged therapeutic stimulation of these plexuses associated with increased formation of the fluid followed by careful examinations has given histological evidence of increased activity in the investing cells.

Of the other sources of origin little need be said. The products of cellular activity are evidently drained off into the perivascular

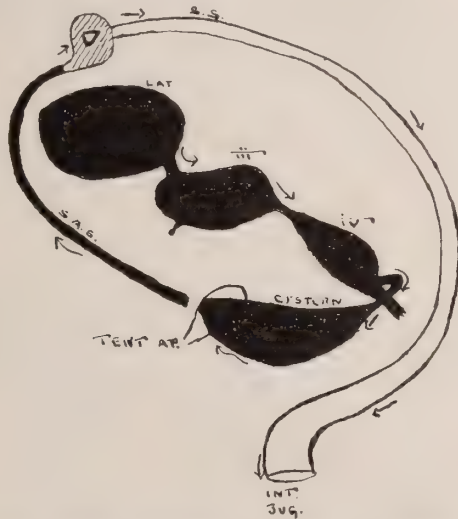


Fig. 2.—Schematic design showing relation of lateral, third and fourth ventricle, cisterna magna, tentorial aperture, subarachnoid space and superior longitudinal sinus. The direction of the current is shown. Blockage between the ventricles, and the cistern at the tentorial aperture (subarachnoid space block), pathological disturbances in the arachnoidal villi (shaded area), or increased pressure in the superior longitudinal sinus (pressure on the jugular or tributary sinuses—(posterior fossa tumors)—all lead to an excess accumulation in the closed ventricular system. The relation of the third ventricle to the infundibular canal (projecting from the lower surface) demonstrates the possibility of pituitary disturbances in distension of the former. Pineal gland tumors may block the aqueduct of Sylvius. Meningitic adhesions may cut off the interventricular pathways.

spaces and thence emptied into the cerebrospinal fluid, thus adding a small part to the fluid which, then, has its origin from two sources.

Recognizing the secretory power of these plexuses and the continuous formation of the fluid (as seen by ventricular catheterization), in a closed ventricular-subarachnoid cavity, we are naturally confronted with the question of the normal means of egress.

Is this absorption a ventricular or subarachnoid process? Artificial separation of the systems has shown that absorption hardly if at all occurs in the ventricles. Phthalein injections into the closed ventricles have demonstrated practically no general excre-

tion, whereas, under normal conditions excretion is almost immediate.

Hence, no local absorption occurs in this locality. Carried, then, to the extracerebral system in the search for the normal means of exit, various investigators, usually in concordance or, if at variance, because of methods used which fulfilled abnormal instead of normal conditions, have shown that solutions, injected into the subarachnoid space may be found in the jugulars within a comparatively short period of time. Further, similar injections of suspended granules have depicted, histologically, the tendency of these minute bodies to collect about the sinuses, especially the superior longitudinal sinus within the arachnoid villi. Further, the absence of granules in the subdural space indicates the patency of the arachnoid membrane, and one concludes that the subdural space is quite separate and apart from the subarachnoid space, and is but a serous cavity. The widely scattered arachnoidal cell nests, histological evidence showing their origin to be from the arachnoid membrane, serve as intradural passages for cerebrospinal fluid to the extradural region. Through the lymph channels, a certain insignificant percentage is taken up. No such channels may be demonstrated in the meninges, but injections have demonstrated the fluid coursing along the perineural spaces of the cranial nerves and diffusing into the surrounding lymph spaces after their exit from the cranium. Other theories have been advanced, none with great weight, concerning the absorption of the cerebrospinal fluid. It is fair to state that the cerebral sinuses, especially the superior longitudinal sinus, are instrumental to a great degree in this absorptive process.

The relation of the internal jugular to the venous sinuses indicates that ligation of the former will cause a rise in pressure in the sinuses and probably interfere with fluid absorption. Such experiments have been carried out and have been followed by an increase in cerebrospinal fluid pressure quite constant, suggesting the imperative necessity of the sinuses in absorption processes.

Hence, an increased accumulation of cerebrospinal fluid may be due to (a) an overproduction of the fluid, or in other words an oversecretion of the choroid gland, the principal factor in the formation of this fluid; (b) to a disturbance in the principal absorptive system—the arachnoid villi and the sinuses—the Pacchionian granules, absent in many animals, and in infants, cannot be considered as a means of absorption, but are most probably pathological villi; or (c) to a mechanical obstruction in the course of the natural flow of this fluid, from plexuses through the ventricles to the subarachnoid space and thence to the sinuses by way of the villi.

In attempting to determine the cause of 'choroidorrhea' the effects of the various extracts and drugs have been carefully tried

out. Some of these have produced a stimulating effect on the secretory activity of the plexus, especially brain, plexus and pituitary injections entirely independent of the transitory action due to the fall in arterial pressure and its effect on the pressure in the sinuses. Muscarine has a stimulating action also. None but thyroid injections had any experimental depressing effect. These experiments, are significant along the line of the toxic origin of choroidorrhea, and with regard to the possibility of dealing with certain essential types by therapeutics.

Turning to the disturbances of the absorptive system *per se* probably the most important recognizable factor so far is a rise in pressure in the cerebral sinuses, thus interfering with the normal infiltration through the mesothelial covering of the arachnoid villi. Pos-



Fig. 3.—(a) Relation of subarachnoid space to falx, superior longitudinal sinus, and corpus callosum. (b) Surgical anatomy of short circuiting operation.

sibly definite pathological conditions in the villi themselves may account for the non-absorption of this fluid. The fact that increased pressure in the sinuses will lead to hydrocephalus has helped quite recently to clear up some previously inexplicable conditions. That posterior fossa tumors, especially, have been associated with the signs of increased tension, has long been recognized. Until recently such signs have been ascribed to tumors themselves, but it has been pointed out that even the largest of tumors may be without such signs. Choked disc, and the other classic symptoms have been considered due to brain tumor. Of these by far the most important is the former, due to infiltration of cerebrospinal fluid along the optic nerve sheaths and compression of the venous return from the retina. The slowed pulse, an anemic stimulation of the vagus centre; the increased blood-pressure, a systemic reflex to overcome



the cerebral anemia; the vomiting, stimulation of this cerebral centre; and headache, probably due to pressure distorting the falx, tentorium or dura, irritating the fifth nerve, are all of importance, but are of far less significance than the disc edema.

Present views suggest that it is not the tumor itself, but the associated hydrocephalus that is the cause of the increased tension. Without these signs, tumor is not associated with the hydrocephalus; if we accept the latter view, with this syndrome (usually in over 90 per cent.) hydrocephalus exists. In some tumors the origin of the associated hydrocephalus is difficult of determination. In others, and especially those of the posterior fossa where early pressure upon the veins of Galen and the sinuses of exit exists, and where early visual disturbances are found, the explanation is simple. To revert, mechanical obstructions in the normal stream, such as block-



Fig. 4.—Relation of cisterna magna to superior longitudinal sinus. Direct connection may be made with a cannula (Haynes) in these cases where the absorptive apparatus *per se* is functionally disturbed.

ing of the communicating foramina or aqueduct by inflammation and the like, must lead to obstructive hydrocephalus. In the essential hydrocephalus with no pathological obstruction, the possibility of a vicious circle has been substantiated by practical relief afforded by suitable procedures. The circle is formed by the excess accumulation of fluid in the cistern pressing on the veins of Galen, thus increasing the intrasinus pressure and depressing absorptive activities, and also possibly forcing the midbrain up and plugging the tentorial opening. This, then, isolates and interferes with the physiological functioning of a large part of the absorptive system and artificially forms a closed system of ventricles and posterior fossa with little absorptive process.

To recapitulate, the choroid plexus is to a large extent responsible for the formation of cerebrospinal fluid; absorption is principally through the sinuses, especially the superior longitudinal sinus. The fluid is within a closed cavity consisting of ventricles

and subarachnoid space; an excessive formation of fluid, or a disturbance (as in essential choroidorrhea or secondary to brain tumor) in absorption, or a combination of both, causes dilatation of the cavities of the internal or ventricular portion, or the cisterns, or both. Mechanical obstructions such as adhesions about the foramina (as in meningitis); pressure on the veins of exit (as in tumor cerebri, especially of the posterior fossa) or in plugging the tentorial opening by forcing upon the midbrain will have a similar practical result. The results of such conditions have been mentioned under symptomatology. In the relief of such conditions therapeusis so far has failed. When a choroidorrhea exists, great enough to overbalance a normally functioning absorptive system, it is hardly too much to expect that some therapeutic measures, with actions the reverse of pituitary and plexus extracts or muscarine, will be found that will *exercise an inhibitory* action on the secretory activity *sufficient to control* this type. Thyroid extract injections suggest the possibility of the discovery of such. When actual disturbances in absorption occur, tending to diminish the activity of this system, it is difficult to say whether therapeusis will avail. In the obstructive form—and it is to be noted that an essential choroidorrhea will often assume this type by pressing on the veins of Galen and by plugging the tentorial aperture by forcing up the midbrain—in such types we have an apparent blocking off of the secretory area from the absorptive area. In such cases, evidently a far greater percentage than formerly considered, it is evident that a communication between these systems is necessary before relief may be expected.

Many operations have been devised; subcutaneous drainage of the lateral ventricles; direct connection between these and the longitudinal sinus; connection of the cistern with the occipital sinus; drainage of the spinal subarachnoid space into the occipital sinus; drainage of the spinal subarachnoid space into the peritoneal cavity, and numerous others. The method of von Bramann is simple in the extreme as compared with other devices whereby the distended ventricles are relieved of their obstruction, whether it be in the foramina or aqueduct; or due to venous pressure in the posterior fossa, or whether it be an essential choroidorrhea (with the characteristic changes in the ependymal cells) with a tentorial aperture obstruction. A simple craniotomy posterior to the coronary suture, which may be performed under local anesthesia, allows entrance to the side of the superior longitudinal sinus. A blunt pointed canula is inserted—carefully avoiding the longitudinal sinus—along the side of the falx into the longitudinal fissure until the corpus callosum or roof of the distended lateral ventricle is encountered. On puncturing this body, the underlying fluid is allowed to escape into the subarachnoid space and becomes in rela-

tion with the superior longitudinal sinus and the cortex. This equalizes pressure, and reduces conditions by short circuit almost to a normal state. The ventriculostomy is lengthened to about 1 cm. and, since the pressure is constant here in the presence of secretory activity, the opening is kept patent by the continual escape of the fluid. Theoretically, with the simplicity of these procedures under careful aseptic surroundings, this is clearly the course to follow as being the simplest, not only in the hydrocephalus of an obstructive type, but also in the essential choroidorrhea of infancy *before cerebral destruction* has occurred, and in the hydrocephalus associated with tumor cerebri, to remove the causes of the blindness, choked disc, headache, and cerebral anemia, or possibly to clear up a topical diagnosis, the symptoms of which are clouded by the hydrocephalus tension—a truly decompressive measure of a simple type, to be essayed before the typical partial craniectomy—provided the tumor is irremovable. That this method will entirely supplant the more difficult procedures on account of its simplicity and its increased efficiency is certain in many cases—as those without actual hyperplasia of the lobes, cerebral edema, or in those in which the actual bulk of the new growth is not a causative factor—the latter, according to later views, being an extremely rare condition. Are the failures—those cases with temporary relief and final recurrence—due to closure of the ventriculostomy opening? Certain it is that we are not increasing the risk and yet may strengthen the utility of such procedures by using some more efficient means, and it is possible that the insertion of a permanent drainage cannula might perhaps reduce still further the percentage of failures in this operation and throw even more optimism on the treatment of such conditions, until recently difficult in surgical technique and often disappointing in practical results until the simplified methods introduced by painstaking investigators.

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In a certain small percentage of cases where the hydrocephalus is a retention phenomenon due to disturbances in the absorptive system *per se*—as perhaps in pathological conditions of the arachnoidal villi—direct connection between the cerebrospinal fluid and the occipital or superior longitudinal sinus by means of a cannula would be more efficacious. On account of the comparative difficulty of this procedure, it is fortunate that this class is much smaller than the class of cases to which we have referred previously.



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## THE DIFFERENTIAL DIAGNOSIS OF HEMORRHAGE FROM THE URINARY TRACT.

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This theme has been and is of such importance that I thought it might not be amiss to discuss it. The subject is one which often confronts both the internist and surgeon, as well as the specialist in the other branches of medicine; and one which until relatively recently has often been obscure, if not entirely unexplained. But now with the more refined methods of diagnosis we can in almost all cases determine with certainty the etiology and source of blood from the urinary tract, and the task is a decidedly thankful one.

In a given case of hematuria there are three all-important questions to be answered:—

1. Is there actually hematuria?
2. Where is its source?
3. What pathology occasions it at the source?

The first question naturally maintains only for very small amounts of blood, as any marked quantity is readily determined by gross examination. Small amounts are readily determined by—

- (a) Microscopic examination.
- (b) By chemical tests, the most simple of which may easily be carried out at the bedside.

A few drops of KOH is added to the suspected urine, and boiled, the phosphates are precipitated, which, unless blood is present, are whitish or grey, but with an admixture of blood appear brown or reddish. Microscopic control is not necessary but I believe advisable. Even the smallest amount is pathological and an attempt at least should be made to explain its presence. Generally speaking, on gross examination we are liable to overestimate the quantity of blood present in a given specimen. Only when coagulation occurs does the amount of blood exceed that of the urine.

In answer to the second question: Where is the source of blood? a glance at this somewhat diagrammatic chart shows the various

and not few possibilities. From above downward we must consider—

1. The renal parenchyma.
2. The renal pelvis.
3. The ureter.
4. The bladder.
5. The seminal vesicles and vasa deferentia.
6. The prostate gland.
7. The urethra posterior and anterior.

These various locations of hemorrhage can usually nowadays be determined with accuracy by the use of the newer methods of examination, especially cystoscopy, ureteral catheterization, pyelography, roentgenography and the various functional tests, which, for the sake of brevity, will be discussed in the treatment of the third question: What pathology determined the hemorrhage at its source?

Starting again from above downward in regard to the differential diagnosis of renal lesions causing hematuria, experience is necessary, and even the most experienced surgeons, using the most modern and approved diagnostic methods, are occasionally forced to an exploratory incision before they render a correct diagnosis. This procedure must not be lightly passed over, nor does recourse to it stamp the surgeon an incompetent diagnostician, nor does it diminish the great value of our newer course.

*Renal Hemorrhage.*—Renal hemorrhage is usually due to one of the following causes: tumor, calculus, injury, congestion and acute inflammation.

The first mentioned is often the most difficult to diagnose, and patients frequently go for long periods with hypernephroma, for example, when its presence is not at all suspected, because in certain cases the hemorrhage therefrom does not begin until very late in the course, in fact, long after metastases are present. Bleeding is often the only symptom in these cases. Pain, loss of weight and enlargement on palpation may fail entirely. The bleeding is similar to that of bladder tumor and usually characterized by suddenness, and apparent absence of cause or precipitating moment; it is usually profuse and of relatively long duration and is not controlled by therapeutic measures, in contradistinction, as we shall soon see, to that occasioned by calculus. If the other above-mentioned symptoms, especially enlargement of the kidney on palpation, are present, then the diagnosis is more readily made.

A differential diagnosis between the various types of renal tumor is almost impossible, excepting by exploratory incision, and in fact is of little practical value.

Renal functional tests, such as the phenolsulphonephthalein, the phloridzin, or the indigo-carmin as a rule, in these cases avail



but little, because a marked difference is not detected, excepting when much renal parenchyma is destroyed. They should, however, not be neglected. The *x*-ray in certain cases may be of marked value, showing enlargement which is not palpable. Ureteral catheterization is the method, of course, by which the source is not accurately and readily determined. The presence of hematuria, of the type described and positively traceable to the kidney, is an indication for an exploratory incision, in my opinion.

In tuberculosis of the kidney, we have frequently as aids in diagnosis general symptoms of tuberculosis, and suggestive history thereof either in the patient or members of his family. Furthermore, pyuria is usually present while the urine shows an acid reaction. Microscopical examination of the centrifuged urine for bacilli of tuberculosis and finally animal inoculation indicate the causative agent. Of the more modern laboratory procedures may be mentioned the antiformin method of digesting extraneous material in the urinary sediment and the Bloch technique, in which an inguinal gland is traumatized by squeezing it between the fingers, thus producing a *locus resistencia minoris*, in which the tubercle bacilli injected in the immediate neighborhood may quickly produce their characteristic histopathology. A combination of the procedures has been advocated by Neckar and Bachrach of the Rothschild Hospital, Vienna. Here again we must rely upon the ureteral catheter and the *x*-ray for the location of the process. Functional tests in these cases, especially if obscure and not discharging freely into the pelvis, may be of decided value. The bleeding *per se* in tuberculous kidney is chiefly early in the course and gradually diminishes. Many cases begin with marked hematuria. Enlargement of the kidney in certain cases can be made out by palpation.

*Calculus.*—The bleeding from renal stone may be considered as almost typical, associated, as it usually is, with typical colic and the effect of change in position or any other violence. The characteristics of the colic are too well known to require any elucidation. Here again of prime value in the majority of causes is the *x*-ray. Practically all stones show shadows except uric acid stones. The kidney is usually tender on pressure. Stone is most likely to be confused with tuberculosis of the kidney.

Hematuria resulting from injury is not usually difficult to diagnose, due to crushes of the body as between cars, or when heavy vehicles pass over the body. Other injuries frequently are associated. Gunshot wounds may also be causal.

*Acute Nephritis.*—Acute nephritis occasioning hematuria is of the so-called glomerular type and may be difficult to differentiate from the hematuria of tumor. Later in the condition, however, casts and albumin are found in quantities after the hematuria has ceased. This type may really be very hard to diagnose, because, in spite of

the condition being bilateral, the blood may proceed from one side only. The functional test may also be of little value, showing only that the process has caused greater shrinking on one side than the other. There are no palpatory findings nor are there usually subjective symptoms referable to the condition. The onset is usually precipitate and unassociated with pain.

*Congestion of the Kidney.*—Blood is almost always absent in simple congestion, according to von Leube, except for isolated red blood corpuscles in the sediment, while if it can be demonstrated in an undoubtedly existing engorgement, it almost invariably points to the simultaneous development of nephritis or hemorrhagic infarct. The quantity of urine in cases of congested kidney is small—1,000 c.cm. and less, dark red in color and of high specific gravity. Casts, if found, are of the simple hyaline variety. With improvement of the underlying cardiac condition, the urine clears up in the course of a few days.

Another type of hematuria of renal origin, which I personally cannot admit, is the so-called hemorrhage from the healthy kidney spoken of by many authors. This I believe to be a fantasy, and I think, furthermore, that many if not all cases will be found to be of tubercular origin, if properly examined.

In wandering kidney we frequently see some hematuria from kinking of the pedicle, causing a passive congestion of high grade. This is usually transitory and may often be determined either by palpation or *x-ray*.

Those lesions of the renal pelvis causing bleeding, chiefly of academic interest and usually associated with the same type lesions of the kidney—namely, stone, tuberculosis and tumor, may be quite rapidly dismissed. The microscope as well as the cystoscope and ureteral catheter, usually fail in differentiating pelvic from lesions of the parenchyma. Casts of course speak for lesion of the renal parenchyma. The presence of ureteral epithelium is likewise of little value, as it may be present in hemorrhage from both sources.

*Ureter.*—The same might be said concerning ureteral lesions which are associated either with those of the bladder or of the kidney—namely, stone, tumor and tuberculosis. The diagnosis of stone in the ureter is very important from an operative and technical standpoint, and the combined use of an ureteral catheter of sufficient density to show plainly on the roentgen plate is of great value in determining whether or not the stone lies within the ureteral lumen. Recently I have used a 7 per cent. or 8 per cent. solution of collargol, which injected into the ureter gives a distinct shadow though of not too great density. When the shadow produced by the suspected stone merges with that of the collargol solution in the ureter, it may be said that it is in all probability stone within the ureter and not phlebolith or calcified gland. The ac-

curacy of this procedure may be assured still further if stereoscopic pictures are made. The hemorrhage is usually scant in amount and is associated with colicky pains. The use of a catheter tipped with wax, which upon coming in contact with the stone in the ureter is scratched, is another method of determining its presence, as well as by use of ordinary catheter, which may show unilateral anuria from obstruction.

*Bladder.*—Those lesions of the bladder which occasion hematuria may with the greatest certainty be diagnosed correctly, if there is no obstruction to the passage of the cystoscope. They are chiefly tumor, stone, foreign bodies and cystitis, with or without ulceration.

Hemorrhage from tumors of the bladder is similar to that from tumors of the kidney and is characterized by its sudden onset, long duration, its failure to respond to therapeutic measures and its great amount. It may last weeks or even months. Bleeding and its subsequent anemia are usually the only symptoms, while that from stone is of shorter duration, of lesser amount, and is referable to exercise and change of position and associated with pain or strangury. The use of the stone searcher or cystoscope will usually clear up these cases quickly. The diagnosis of foreign bodies in the bladder is determined by history and cystoscopic examination.

Hematuria occasioned by cystitis is associated with tenesmus, frequency, and the microscopic findings of pus and micro-organisms, as well as red blood corpuscles. Especially in tuberculous cystitis is the hemorrhage small in amount, even in the presence of ulcerations. Here again the cystoscopic examination is of great value in diagnosis, showing hyperemic areas, suggillations, ulceration, but no stone.

I shall report an unpublished case which I cystoscoped about a year ago, in which I could find no cause for a severe hematuria of bladder origin and which I could explain in no other way excepting as a marked arteriosclerosis of the bladder wall. At my request a fundus examination was made, and here, also, arteriosclerotic changes noted. I find no report of a similar case in the literature. The patient placed on appropriate treatment was free from hematuria when I heard from him last about four months ago. Hemorrhage from the seminal vesicles is associated with bloody pollutions and terminal hematuria. The objective findings are determined by rectal examination, such as swellings, nodules and areas of marked tenderness. This type is to be differentiated chiefly from the two other sources below the bladder causing terminal hematuria—namely, cystitis colli or inflammation of the neck of the bladder, and tumor of the posterior urethra, usually papilloma. The presence of such a tumor may be readily seen either by the posterior urethroscope of Goldschmidt or of Wassidlo, and in fact can usually be



seen with the ordinary straight tube. This lesion produces usually no subjective symptoms.

*Hemorrhage From the Anterior and Posterior Urethra and Prostate.*—As far as this source of hemorrhage is concerned, we must remember the physiological division of urethra into anterior and posterior, and that the sphincter externus divides them so that hemorrhage from the anterior urethra shows at the meatus, while that from the posterior urethra passes over the internal sphincter into the bladder. When hemorrhage from the posterior urethra is marked, it may be very difficult to differentiate from hemorrhage of bladder origin. If, as usual, the hemorrhage is slight, then the first glass is clear and the second cloudy or sanguinolent, or just at the last moment a few drops of pure blood are emptied.

Terminal bleeding indicates that the source of the hemorrhage is just in front of the bladder neck. There are, however, two exceptions to this rule, first, small bladder stones which, just at the end of the act of urination, impinge at the sphincter and by the trauma inflicted cause hemorrhage. The same may occur when prostatic stones intrude into the urethra, as also with small papillary tumors of the bladder located in the immediate vicinity of the sphincter. Here the easily bleeding papillae may be compressed by the sphincter internus and a small vessel may burst, giving rise to terminal hematuria.

The anterior urethra is an unusual site for hemorrhage, and here it is usually due to urethritis, especially gonorrhea, or the injections or irrigations used in the treatment of the condition. Diagnosis is usually very easy from the history and microscopic examinations.

Strictures of the urethra seldom occasion spontaneous hemorrhage. Sometimes back of these strictures are dilatations in the walls of which are dilated vessels which may rupture and cause hemorrhage. Diagnosis is not difficult and is effected by the insertion of an olive-tipped bougie.

Injuries of the urethra from falls, blows, kicks, instrumentation may, of course, cause hemorrhage, but the history alone usually makes the diagnosis. However, when a history is not obtainable, and there is no evidence of trauma to the skin, the diagnosis may not be so simple. But the introduction of a soft Nélaton catheter will usually clear up the case. If there is but a small lesion of the urethra, the tip will readily glide over it, but if the break in continuity be great, the catheter tip engages therein and thus leads one to its location and character.

For lesions of higher origin the cystoscope is fortunately of great aid in diagnosis. By its use one can determine whether the blood is coming from the entrance to the bladder or from the prostate, or whether from the right or left ureteral orifice. When the bleeding is so small as to give only a slight discoloration, then the cystoscopic

examination alone will often not suffice to make the diagnosis. Here we must resort to catheterization of the ureters and examine the urine microscopically and chemically for blood from each side. It is, of course, possible to produce trauma of sufficient grade by the procedure of catheterization through a rather narrow ureter. This occasion is best determined by microscopic examination; the red blood corpuscles from recent catheter trauma show the usual concavity or disc shape of the corpuscle and the spike-like projection familiar to all, while in spontaneous hemorrhage there are noted, especially, faded-out, indefinite corpuscles and many so-called 'shadows.' Also when the catheter is advanced a little further into the ureter, the bleeding ceases or at least diminishes, while in spontaneous hemorrhage it remains the same. Furthermore, we know that when the ureteral catheter is left *in situ* a sufficient length of time, occasional red blood corpuscles are noted as a result of diapedesis; for that reason the specimen examined for blood should be gained in the first few minutes after introduction of the catheter.

Lesions of the prostate and prostatic urethra are less known and less sharply defined. These hemorrhages occur with prostatic hypertrophy and are of sudden onset and are often very profuse. They are usually not associated with pain, but with urinary obstruction or retention. A diagnosis is made by rectal and, if possible, by cystoscopic or urethroscopic examination.

In conclusion I may state that while the diagnosis of hemorrhage from the urinary tract is not in every case possible, as regards its source and pathology, modern methods combined with careful painstaking examination into symptoms, both objective and subjective, in conjunction with the free use of microscopical, chemical and bacteriological examination of the urine will lead in the vast majority of cases to a correct understanding of the cause, which after all, is of major importance to the welfare of the patient. Because then, and then only can rational, intelligent therapy be begun.

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## THE FUNCTION OF THE FORAMEN OVALE.

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There was a time in the history of anatomy when structural relations were all too readily translated into terms of function. An example of this may be found in the circulatory system, for while the foramen ovale and the ductus arteriosus were known to Galen, the function of these two blood passages in the fetus has been misunderstood, either through insufficient information concerning the general morphology of the circulatory system or through failure in application of the simplest laws in physics. It has been assumed, because a double circulatory cycle is found in the adult bird and mammal (pulmonary and systemic circulations), that a similar segregation of arterial from venous blood must also be present in the embryo. Further, it has been inferred because of the definite separation of the bloods in the warm-blooded adults that such must also be the case in the cold-blooded forms. Even Tandler (1913), in his admirable treatise on the heart, has disregarded the evidence which has appeared more or less sporadically during the past seventy-five years. The great difficulty in the proper understanding of the problem has come about through not applying the facts already known, and approaching the question from a comparative standpoint. I would, therefore, consider briefly the more important steps in the phylogenesis of the heart and branchial vessels and their relation to the general physiological problem before answering the objections raised to my work on the fetal circulation, and in particular to the function of the foramen ovale. The information regarding the important steps in the development are given in simple figures—necessarily schematic and more or less arbitrary in form.

The development of the heart and branchial vessels is one of the best illustrations of the theory of recapitulation, in that the plan laid down in the development of the species is closely followed in the embryology of the form. We may, for purposes of convenience, divide all vertebrates into two classes—the cold-blooded animals in which the body temperature is not materially different from that of the surroundings, and warm-blooded animals in which a constant body temperature is maintained under all conditions of environment. The body temperature of the warm-blooded animal is held constant through variability in the oxidation processes occur-



ring within the body, and this implies the advent of a different type of metabolism in which larger quantities of oxygen may be taken up and employed. The transition form from the cold-blooded to the warm-blooded animals is wanting, although it is possible that the prehistoric *Archyopteryx* was a creature of this type. The developmental transition is, however, quite sharply defined and will be considered later. It is therefore essential to the proper appreciation of our problem that a study be made of how the animal obtains the oxygen; how this is conveyed within the body; and in what manner the circulatory system is adapted to give a maximum efficiency in its distribution.

The cold-blooded animal in which a high degree of oxygenation is not essential to the maintenance of life includes the fish, the amphibian and the reptile; while the warm-blooded animals show evidences of their higher body temperature in the insulation against the radiation of heat: feathers in birds, and fur in mammals. It will at once occur to the reader, if we select the fish, the frog, and the turtle as our representatives from the cold-blooded forms that the first is purely aquatic in habit; the second starts life in the water (tadpole) and undergoes a metamorphosis into an air-breathing adult; while the third is an air-breather from the start, like the mammal and bird, and therefore breathing with membranes (amniote) until the lungs become functional.

The fish lays its eggs in the water and the form usually remains aquatic in habit throughout its life. The heart is a simple two-chambered affair. The auricle receives the blood from the systemic veins and passes it through the single auriculo-ventricular opening into the ventricle. The ventricle expels the blood through the single heart efferent (bulbus) into the ventral aorta to be distributed through the afferent branchial vessels to the gills. The blood is collected from the gills by the efferent branchial arteries and is passed into the two dorsal aortæ which unite below in a single aortic trunk. It will be seen that here is a simple arrangement by which all of the blood is sent through the gills (indicated as breaks in the diagram) before it is distributed to the systemic vessels, and we may infer that the oxygenation of the blood is fairly complete for the purposes of the fish. We do not know a great deal about this side of the problem because there is little definite information as to the amount of hemoglobin, the amount of blood, the rapidity of the circulation, or the completeness of the saturation from the surrounding medium. In general, however, there is a relative increase in the amount of blood and in the numbers of red cells, together with their content in hemoglobin, as one progresses up the vertebrate scale, although the change is naturally most marked from the reptile to the bird. The scheme of the fish

circulation (Fig. 1) will be employed as the basis upon which the other diagrams are to be constructed.

The first marked modification in this scheme is found in the lung-fish family (*Dipnoë*) where respiration in the adult is effected through lungs and gills. With the development of lungs, a new artery arises from the last (caudal) efferent branchial, and the blood from this pulmonary artery is collected by the new pulmonary vein and returned to the heart. The auricle shows the signs of the beginning of a division into two: a larger right part connected with

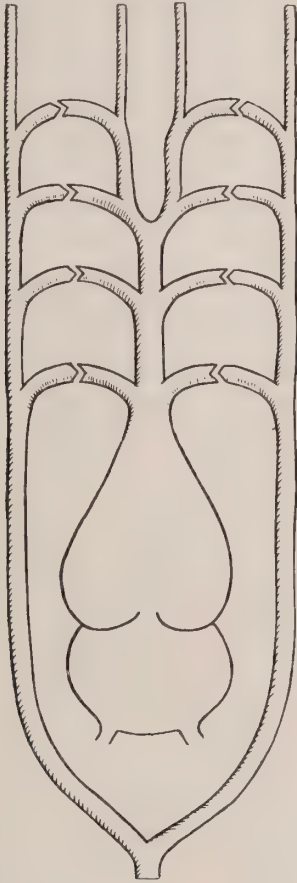


Fig. 1.

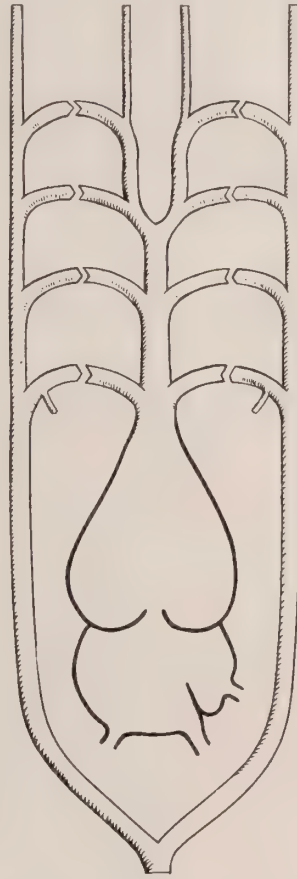


Fig. 2.

the systemic veins, and a smaller left auricle segment receiving the pulmonary return (Fig. 2).

The auriculo-ventricular opening is still single and no marked modification arises in the ventricle on heart efferent system. There is no possibility of a separation of arterial from venous blood in this type of circulation, although it has very naturally been suggested, and it is interesting to note that the blood going to the lungs is derived from the caudal efferent branchial vessel or after it has

passed through the gills. The habits of this curious fish must be more thoroughly studied before conclusions of any value may be attained. It is, however, not unlikely that the lungs may be accessory organs of respiration in the usual free swimming form, and be the chief means of obtaining oxygen when the fish is in its cocoon state and buried in the mud. The type of circulation is however not unlike that found in the tadpole during the metamorphosis.

The circulation in the adult frog (Fig. 3) changes the picture

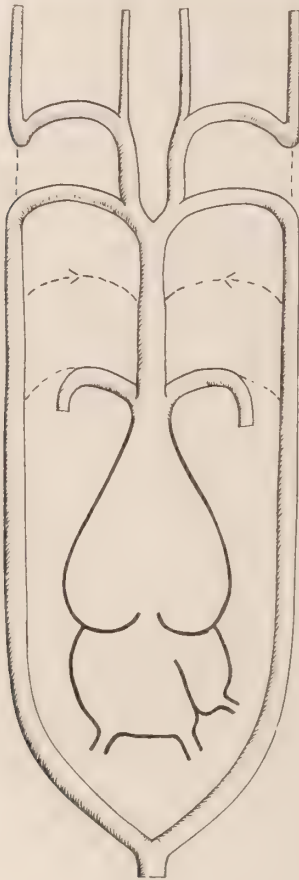


Fig. 3.

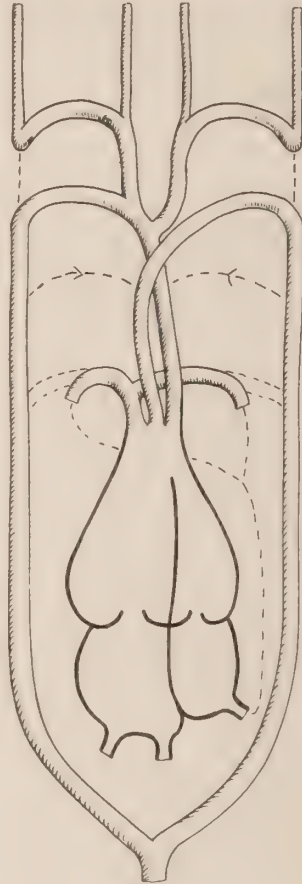


Fig. 4.

quite a little because gills have now been lost and the branchial arteries resolved into definite trunks of the neck: the carotid, aortic and pulmonary arches. The carotid and pulmonary arches have lost their connection with the general aortic system, and a certain asymmetry has crept in which has been omitted from the figure to avoid confusion. The auricle has been divided still further, but there is one auriculo-ventricular opening and a single ventricle. A new structure, however, has appeared in the single vessel leaving the heart (bulbus), known as the spiral valve, and to this struc-



ture has been ascribed the function of separating the more impure blood coming from the right side of the spongy ventricle from the more pure blood derived from the lungs and skin in the left part of the ventricle. In this manner the frog is supposed to enjoy the circulation of a better quality of blood through the head-vessels, which in turn is supposed to explain something else. From my own work on the frog's bulbus I cannot see how it can function in the manner usually described, and do not believe, with the evidence at hand, that any appreciable difference in the quality of the blood directed to the head, as opposed to the remainder of the system, may be assumed. The discussion of this point is not germane to the question and we may dismiss the topic with the statement that the spiral valve is probably a forerunner of a separation of the single heart into a double heart from the front just as the auricular septum separates it into two from behind. Both these structures at this stage might represent exactly the reverse of rudimentary organs—organs which have a functional value in higher forms.

The turtle carries its respiration to a still higher plane, in that it restricts the oxygenation of the blood to the lungs. It will be seen in Fig. 4 that a marked change has come in over what was pictured for the frog. The auricle is now completely split into two auricles with two auriculo-ventricular openings. A start is also made in the division of the ventricle which is completed in the highest reptiles—the crocodile family. The separation of the bulbus indicated in the spiral valve of the frog has progressed so that the right aortic arch opens to the left of the ventricle, while the left aortic arch and the pulmonary stem occupy a position to the right of the ventricle (Fig. 4). The asymmetry indicated in the frog has become more obvious in the inclusion of the left aortic arch (not giving rise to carotid arteries) toward the right side of the ventricle along with the orifice of the pulmonary artery. It has been assumed that here is an adaptation which results in a better quality of blood to the head region of the turtle, in that the right aortic arch gives off the carotids and arises from the left side of the ventricle. The experimental evidence for this is to be found in the single injection experiment of Greil which is in accord with the above description. My own injection experiments in two species of turtles, however, show that if starch granules are injected into the right or the left auricle, or both, during diastole they are always recovered simultaneously from all three vessels, and this is in direct opposition to the above. Further, if it is so necessary for the turtle or the alligator to have a better quality of blood circulating in its head region, what explanation may be offered for the embryo circulation where the heart is in the adult state, and the conditions are exactly as in the adult, but the oxygenated blood comes into the

right auricle? Would this mean that during the period of rapid growth, the head receives the poorest quality of blood?

It has not been demonstrated that a segregation of arterial from venous blood occurs in the cold-blooded animals, and the whole misunderstanding has come about through direct translation of the conditions as they obtain in the warm-blooded adult, without any consideration of the physiological requirements. Why the heart should undergo the modifications in its structure as the type of respiration advances is not known, but that it is a purposeful arrangement after the manner usually described is undoubtedly incorrect.

I have stated that there is no transition form from the cold-blooded to the warm-blooded animals, but under our definition of a cold-blooded animal, we must agree that the embryos of the warm-blooded forms are quasi-cold-blooded until they are hatched or born. The temperature of the embryo is about that of the environment and there is no internal arrangement for the maintenance of body heat. The environment necessary for the development must be created for the embryo through application of the body of the parent or by direct gestation. This is not a novel idea because it was first suggested by Peaslee in 1854, and Preyer (1885) has demonstrated that the greater demand for oxygen in the developing chick does not arise until the nineteenth day of incubation.

The adult bird and mammal have a type of circulation which is quite different from any noted thus far. The heart is completely divided into four chambers of like capacity, and it is this which makes it possible to segregate the arterial from the venous blood. The chief difference in the branchial vessels comes about in suppressing the second aortic arch of the reptiles and the similarity of the circulatory relations in the bird and mammal (compare Figs. 5 and 6) are at once apparent. Apart from the direction of the aortic arch they are quite alike.

The heart of the embryo bird and mammal is adapted for the rapid conversion to a new type of circulation at birth, and this was first correctly stated by Williams in 1843. The lungs in the embryo are non-functional and with the persistence of the distal segment of the last branchial artery (ductus arteriosus) a by-pass is created to allow the excess of blood from the territory of the right ventricle to escape into that of the left. This results in greater return to the right auricle than to the left, as in the cold-blooded forms; but inasmuch as the ventricles are of like capacity, an opening or openings appear in the developing auricular septum to allow the excess of blood in the right auricle to pass to the left side. Fig. 7 indicates the relations in the embryo mammal on the scheme of the adult; the bird is somewhat different, particularly in the manner of the

septal perforations in the auricle, and a double rather than a single ductus.

The bird and mammal heart, therefore, show early in the embryology an adaptation to a condition which will not be functional until the time of lung function, and this is no more mysterious or no less mysterious than the incomplete auricular septum and spiral valve of the frog representing structures which probably have no function in the frog family but are adaptations for a condition

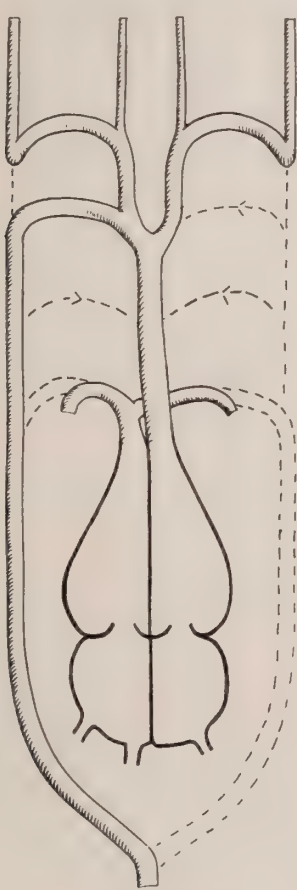


Fig. 5.

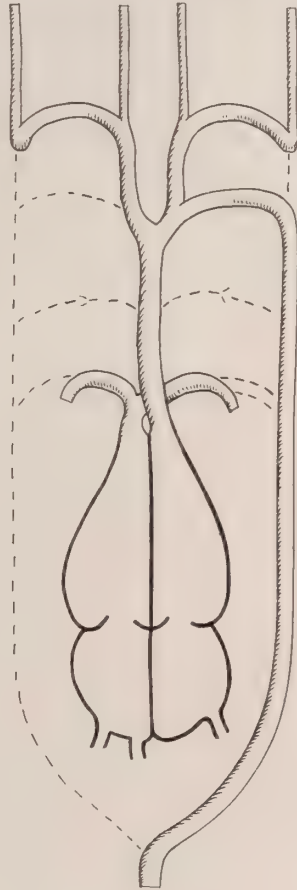


Fig. 6.

which is to come later on in the phylogeny. Just as we may have rudimentary organs which have no known function in the form, but are functional in the ancestral history, so we may also have structures in higher forms incompletely developed and of no known function in a given form which may be made use of later in the history. Functionally there is no occasion for a segregation of bloods in the embryo (see later), and an embryo mammal with a turtle or even fish type of heart is perfectly competent to complete its development in a relatively normal manner only to expire at the



time of birth through inability to convert its circulation from the cold-blooded to the warm-blooded type.

The phylogenesis of the heart and branchial vessels therefore shows structural modifications to the type of respiration, and briefly the matter may be reviewed as follows. The pulmonary artery is a derivative of the last branchial efferent, and with the development of the lungs and a pulmonary return, the single auricle shows signs of a division which is not to be completed until the form is purely

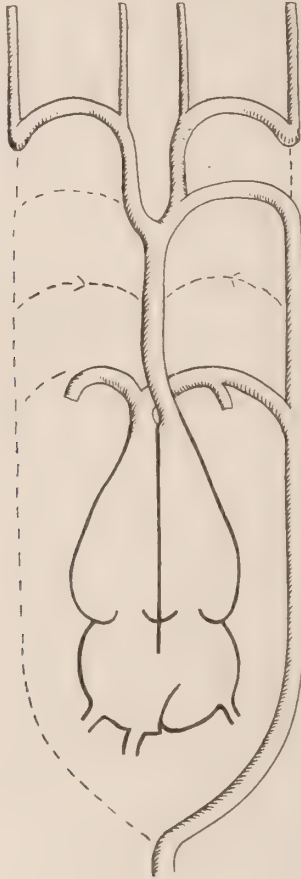


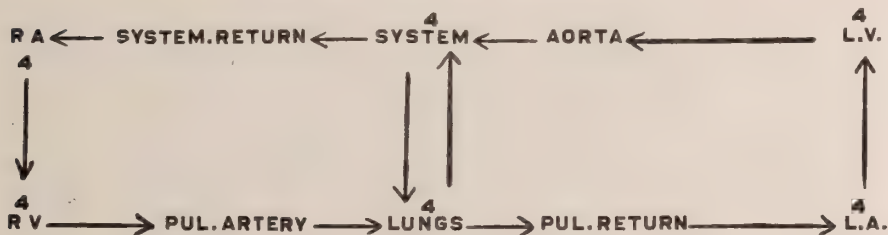
Fig. 7.

a lung breather (reptiles). With the loss of gills, the ventral aorta and bulbus begin to divide into a pulmonary and aortic compartment, the separation again not completed structurally until the reptile family is attained. The ventricular division first appears in the reptile family and is completed in the Crocodilia, the result being a separation of the heart into four chambers, the auricle and ventricle of the right side having greater capacity than that of the left. With the complete separation of the heart into four chambers,

a secondary compensating (?) opening arises in the Crocodilia at the base of the great vessels (foramen of Panizza), and the function of this opening is by no means clear at the present writing. In the bird and mammal, early in the embryology, the ventricle splits into two chambers of like capacity and the second aortic arch is suppressed. However, the return to the right auricle is greater than that to the left, due to the persistence of the distal segment of the last branchial artery (ductus), and this excess to the right auricle is compensated through the appearance in birds and mammals of a communication through the auricular septum. This represents an embryo adaptation to allow for the rapid change from a cold-blooded type of circulation to that of the warm-blooded post-embryonal form, and therefore demands a proper consideration of the function of the foramen ovale and the ductus arteriosus. The manner of the functional closure of the latter will be a topic for a later paper.

The differences between the circulation in the adult bird and mammal over that in the embryo may be represented in the following formulæ where the quantity of blood is represented in purely arbitrary figures for the purposes of clearness.

ADULT BIRD AND MAMMAL.

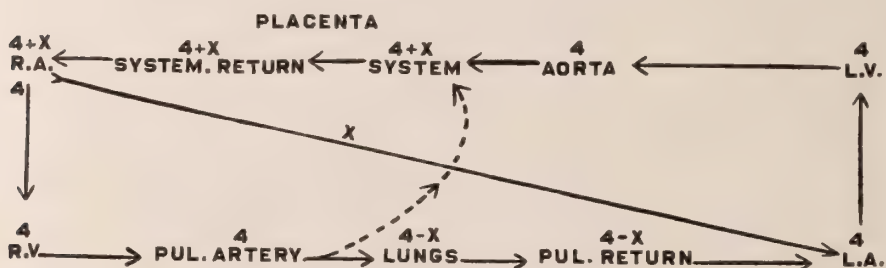


The upper line from right to left represents the systemic circulation, the left ventricle expelling the arbitrary quantity 4 through the aorta into the system to be returned to the right auricle. The lower line, reading from left to right, takes the 4 blood contributed to the right ventricle and sends it through the pulmonary artery to the lungs (pulmonary circulation) to be returned to the left auricle.

There must, however, be some safety valve in this scheme, because it is impossible to conceive that the right and left ventricles always expel exactly the same quantity of blood. Henderson and Prince (1913) deduce from their experiments that "this ability of the left ventricle, under high pressures in the lungs, to pump more blood than the right is the function which normally prevents pulmonary congestion." In other words, the left ventricle shows an important physiological compensation in its ability to handle variable quantities of blood so that "other things being equal, the vol-

ume in the lungs must vary as the tonus of the left ventricle." There is, however, a strictly anatomical way in which the circulations may be balanced in part, and from the work of Miller on the anastomosis between the bronchial and pulmonary systems, it is not unlikely that a second safety valve may be at hand to compensate, through this connection, long-standing additions or subtractions in the volume of blood in the pulmonary circulation. This by-pass, indicated by two arrows, makes it theoretically possible for the right ventricle to return blood to the right auricle, and similarly for the left ventricle to return blood to the left auricle. I am not prepared to state that this has any clinical significance.

The fetal circulation constructed on the above scheme would read as follows:—



It will be seen with equal ventricular capacity represented by the arbitrary quantity 4, that the foramen ovale transmits  $x$  (the excess of blood returned to the right auricle) to the left auricle, and thereby makes up the deficit in the pulmonary return caused by the quantity  $x$  which passed through the ductus into the systemic circulation. In other words, the foramen ovale arises because of the persistence of the ductus to balance the circulation in the four-chambered warm-blooded heart, and functional patency of the foramen ovale is therefore directly dependent on the functional patency of the ductus. It is idle to believe in the functional patency of the ductus arteriosus unless the foramen ovale is also open or unless there is some tremendous and therefore evident compensation in the bronchial circulation. The open foramen ovale and the patent ductus will therefore have no significance in an otherwise normal heart unless both are open. This point seems to have quite missed the attention of the clinicians, and even some of the present-day obstetricians still place the baby on its left side to facilitate the closure of the valve of the foramen ovale.

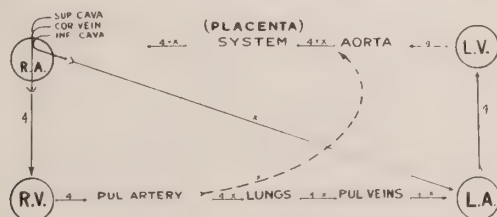
In 1909 I wrote an article, to which I respectfully refer the reader for a more detailed consideration of the bibliography, in which I took issue with the work of Ziegenspeck on the placental circulation and also with the generally accepted notions of the course of the blood through the fetal heart. Inasmuch as there has been reply to my work, I take the liberty of presenting this paper on the



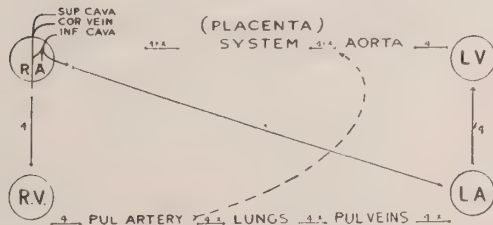
function of the foramen ovale in the hope that it will receive either more general acceptance or condemnation as the evidence may warrant. Whatever the practical value of the transformation from the fetal to the adult type of circulation, it is of sufficient theoretical interest to have it at least correctly stated. The practicability of a thing is after all in direct proportion to firmness of its theoretical basis.

There are three theories on the function of the foramen ovale, and I will show the differences in opinion graphically on the scheme of the fetal circulation given above. It will be necessary to analyze the return to the right auricle into its three parts, otherwise the scheme is the same. The schemes are labelled with the names of the originators although the thirteen centuries between the two names in the first prelude, of course, the possibility of a collaboration.

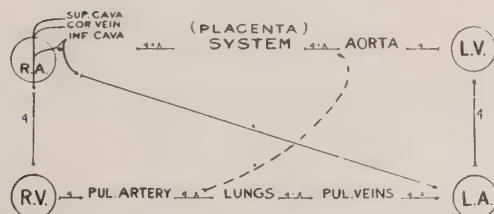
It will be observed that the differences in opinion are concentrated into the upper left hand corner of these schemes and particularly in the course of the blood entering the right auricle through the cava inferior. Scheme I shows that the blood entering the right auricle through the three returns mixed and that mixed blood



Scheme I (Galen-Harvey).



Scheme IIa (Von Hallen-Sabatier).



Scheme IIb (Wolff).

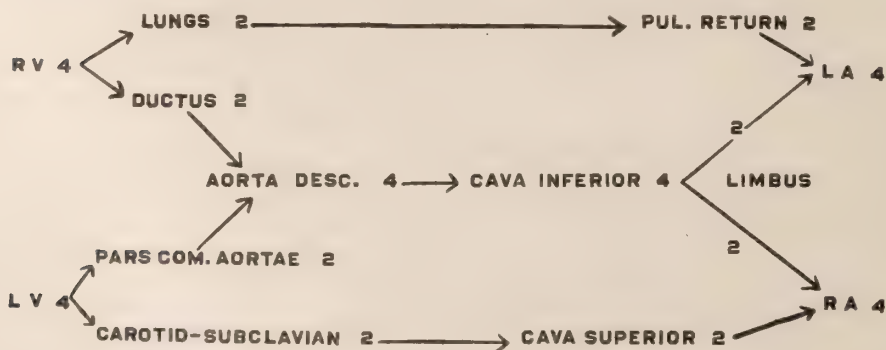
The dagger represents the position of the limbus or free edge of the foramen ovale, and the asterisk the position of the Eustachian valve.

passes through the foramen ovale into the left auricle. This scheme is the one favored by my work. In Scheme IIa, the Eustachian valve is represented shunting the blood entering the right auricle through the cava inferior into the left auricle through the foramen ovale. The foramen affords, therefore, a function connection to the blood entering through the cava inferior as opposed to Scheme IIb where it is supposed to be structural. Here the cava inferior is supposed to have two orifices, one into the right auricle and one into the left through the foramen ovale; the division being effected by the free edge of the foramen ovale or the limbus. This scheme is favored by Ziegenspeck, whose reply to my work I will take up in detail later.

Scheme IIa is the one usually presented in the textbooks dealing with this problem, and is crammed into the heads of students as if it were gospel. I might state parenthetically that the last investigator to support this view was John Reid in 1835. I labelled it in my former article as morphologically inaccurate, developmentally unnecessary, and physically impossible, and this is the one point in which Ziegenspeck and myself are in complete agreement. The major premise on which this hypothesis is based is hopelessly inaccurate, but like some of the other 'functional explanations' it is firmly rooted and will be difficult to eliminate.

Inasmuch as Ziegenspeck formulated a law based on his anatomical findings in the embryo circulation (*Das Gesetz der Halbierung des Blutes*) which is founded on Scheme IIb, I will present his views in a somewhat different formula which he himself declares a clear and concise statement.

This formula expresses the conditions as presented in Ziegenspeck's diagram of the placental circulation.



In other words, the blood coming from the right ventricle is divided into equal parts, one-half going to the lungs and the other half into the aorta descendens through the ductus. Similarly, the blood from the left ventricle is distributed half to the carotid-subclavian vessels and half through the pars comm. aortae (segment

between the left subclavian and the ductus) into the aorta descendens. The pulmonary return, therefore, equals the return through the cava superior. The blood of the cava inferior is split upon the limbus, half going direct into the right auricle and half through the foramen ovale into the left auricle. The foramen ovale therefore affords a structural connection between the left auricle and the left side of the orifice of the cava inferior and is not a communication between the two auricles.

Granting the ventricular capacity and pressure equal, as assumed by Ziegenspeck, I entered three mechanical objections to this scheme: (a) the inaccuracy of his consideration in the return to the right auricle; (b) the error in his contention that the pars comm. aortæ and the ductus transmit equal quantities of blood, equal again to one-half of the capacities of the right and left ventricles; and (c) the method by which he grants the filling of the auricles and ventricles from the cava inferior.

(a) Ziegenspeck's scheme does not include the return from the aorta by other channels than the carotid-subclavian vessels into the right auricle, and the aorta descendens into the cava inferior. He omits the coronary, bronchial, azygos and lymph return. He freely admits having omitted these paths, and replies that "they have hitherto never been considered by one of the many investigators" and "to this I will add as a fifth point, the capillary circulation in the tissues, which is adapted to compensate for much or perhaps all of this difference." The reason why no one has considered these paths is because Ziegenspeck was the first to formulate a quantitative distribution of the blood in the fetal circulation; and his statement that the capillary circulation is adapted to compensate for the errors in his scheme, which he himself admits, I will not discuss but will label it Hypothesis I.

(b) The contention that the pars comm. aortæ and the ductus transmit equal quantities of blood arises out of necessity. Ziegenspeck attempts to prove this in the following manner. If the ventricles are of equal capacity (which he assumes), and the pressure exerted by the two ventricles is the same (and this he deduces from comparative measurements of the thickness of the ventricle walls), then if these two vessels are of like calibre, they transmit equal quantities of blood which is returned to the heart through the cava inferior (note Hypothesis I).

The first point he attempts to prove by calibrating the vessels, and finds with few exceptions that they are of equal calibre. In 22 cases where he measured the ductus and the pars comm. aortæ to be of like calibre, he also supplies the calibre of the aorta descendens, and therefore affords a direct check on the validity of this method. The flow of fluids through circular pipes is proportional to the squares of their diameters. Checking on these twenty-two measure-



ments of Ziegenspeck and comparing the measured with the calculated value of the aorta descendens, I found the measured value short by about 20 per. cent. carrying capacity (18.63). Ziegenspeck replies to this (a) that in some of his measurements the thickness of the vessel wall was included; (b) that I did not report all of his cases; and (c) that the mathematics employed were of questionable accuracy. I cannot hold myself responsible for the inaccuracies in his measurements which I took at their face value and will therefore content myself with a reply to the mathematics, and will then check on the only 3 cases I did not include in my previous article, because Ziegenspeck himself calls them exceptions. Ziegenspeck maintains that the carrying capacity of circular vessels is in proportion to their areas and the area he insists must be computed with  $\pi$  at 3.1415926 to approach accuracy. Let  $x$  = the calibre of the ductus,  $y$  = the calibre of the pars comm. aortæ, and  $z$  = the calibre of the aorta descendens, my contention was  $x^2 + y^2 = z^2$  or  $z = \sqrt{x^2 + y^2}$ , or according to Ziegenspeck

$$\left(\frac{x}{2}\right)^2 \pi + \left(\frac{y}{2}\right)^2 \pi = \left(\frac{z}{2}\right)^2 \pi \text{ or } x^2 + y^2 = z^2. \quad \text{Q. E. D.}$$

The exceptional cases which Ziegenspeck maintains prove the rule are as follow:—

No.	Ductus	Pars comm. aortæ	Aorta desc.	Calculated
13	3.5	2.5	4.0	4.3
28	3.0	3.5	4.0	4.6
31	5.0	4.0	6.5	6.4
Average	3.8	3.0	4.8	5.1

We find in these 3 exceptional cases that only one approaches accuracy and the aorta descendens measured averages 0.3 mm. too small or about 12 per cent. carrying capacity. It is quite impossible to estimate the flow of the blood through vessels in this manner because too many factors enter which are conducive to error. Ziegenspeck agrees with me, for he says "because all of these factors may not be determined without disturbing the placental circulation, it was necessary to indulge in speculation." We may therefore define Ziegenspeck's quantitative distribution of the blood as Hypothesis II.

(c) Ziegenspeck claims that the heart exerts a marked suction action upon the orifice of the cava inferior during diastole. "Each ventricle in diastole aspirates the amount of blood necessary to its complete filling from the cava inferior," and "Each auricle aspirates enough blood to fill it completely from the cava inferior." In his second article he goes on to state that "Pohlman denies a marked suction action of the ventricles; denies an equal division of blood in the placental circulation; and cannot understand how anyone can maintain that the foramen ovale does not afford a com-

munication between the auricles." This would imply that either I am flying into the face of the facts or that Ziegenspeck is leaning his law upon a third hypothesis—the directed aspirating action of auricles and ventricles upon the blood entering the heart through the cava inferior as opposed to all other sources of return.

My statement in my previous article was sufficiently guarded and I do not retract it. I will quote what seems to be more or less generally accepted. Porter says "negative pressure in the ventricle has little effect on the pressure in the auricle. The second diastolic fall is caused by the contraction of the ventricle and not relaxation of the auricle. The second diastolic fall is an important factor in filling the heart." That an aspiration occurs during systole seems to be borne out by the careful work of Piper whose pressure tracings

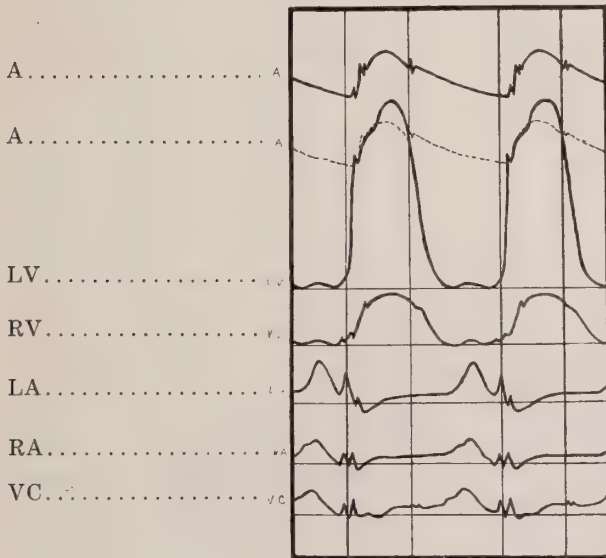


Fig. 8.

are reproduced in Fig. 8. The only negative auricular pressure is to be found about the completion of ventricular systole and a suction action upon the cava is conspicuous by its absence. According to the work of Donders and Bernstein the fetal thorax exhibits no negative pressure, and the experiments of Piper in open chest can therefore be readily carried over to the fetal circulatory system. Ziegenspeck's contention for the suction action in the manner described by him is clearly not in accord with the established facts.

The Law of Equal Distribution of Blood in the Placental Circulation may therefore be said to rest upon three hypotheses: (a) that the capillary circulation is adapted to compensate for all of the errors in the consideration of the return to the right auricle; (b)

that the ductus and pars comm. aortæ transmit equal quantities of blood in spite of the evidence to the contrary; and (c) that the auricular and ventricular diastole results in a suction action which is directed upon the orifice of the cava inferior as opposed to all other auricular return. These three hypotheses I regard as untenable individually and collectively.

The attempt was made to prove in the living pig embryo: (1) that the ventricular capacity was equal; (2) that the ventricular pressure was equal; (3) that starch granules injected into the umbilical vein were recovered from both ventricles simultaneously; and (4) that starch granules injected into the cava superior were recovered simultaneously from both ventricles. Ziegenspeck quite agrees with the findings in 1, 2 and 3 which are in accord with his views; but when experiment 4 shows that the blood entering the heart through the cava superior was distributed to both ventricles, it develops I was working on dying and not living pigs, and the artificial conditions imposed gave rise to these aberrant findings.

I would say in closing the discussion of these schemes, that the von Haller-Sabatier and the Wolff-Ruedinger-Ziegenspeck conceptions differ but little from each other, one holding a functional connection and the other a structural connection between the cava inferior and the foramen ovale. Ziegenspeck's 'law' seems to disprove itself; and the Galen-Harvey scheme covers all of the facts both in the embryology and the comparative anatomy of the system, and is in no way opposed to the general conception that a distinct segregation of arterial from venous blood does not come about until the post-embryonal bird and mammal is reached.

The anatomical basis upon which Wolff, Ruedinger, Ziegenspeck, Preyer and others rested their contention that the foramen ovale is not a defect in the auricular septum, but an opening through which the cava inferior empties into the left auricle is about as follows. When the heart is hardened *in situ* and removed from the body, an opening may be created into this region without disturbing the relations by cutting away the cava inferior close to its union with the auricle. Looking into this opening the limbus appears almost to bisect the apparent orifice of the cava inferior, so that the left hand wall of the vein seems to continue directly through the foramen ovale into the valve of the latter. Fig. 10, which together with Fig. 9 is copied from Ziegenspeck, shows the relations in a section taken through the plane indicated by a dotted line in Fig. 9. It might be added that Ziegenspeck himself finds that the left hand orifice of the cava inferior is somewhat narrower than the right, but does not appreciate that this offers a physical objection to his scheme. There seems to be some error in drawing in Fig. 10, for it appears that the left wall of the cava inferior is continued directly into the valve of the foramen ovale, while the right wall is lost in



the Eustachian valve. The two flaps appear to merge into the limbus inferiorly. I present therefore Figs. 11 and 12 which more nearly approach the true picture. The sections were taken from a seven-eight month fetus and the cut made along the plane indicated in Fig. 9. The left figure (11) is viewed from above while Fig. 12 is the lower view of the section which fits on the preceding one. It will be seen that the limbus (free edge of the septum secundum) is continued to the extreme left side of the orifice of the cava inferior, and there is a 9 mm. interval between the limbus and the

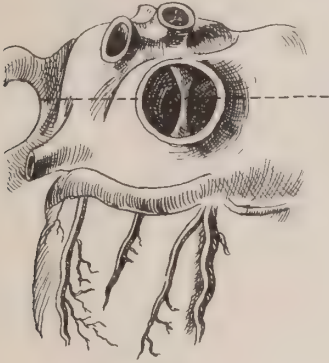


Fig. 9.

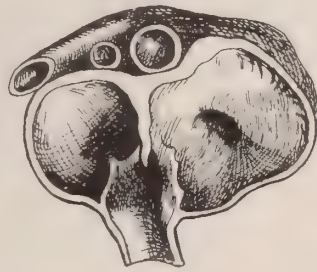


Fig. 10.



Fig. 11.

Fig. 12.

plane of the orifice of the cava inferior in this specimen. There is little doubt but that the limbus is part of the auricular septum, and this is even more apparent in Figs. 13 and 14 taken from a term child that had breathed feebly. Here the auricles are more markedly distended and the distance from limbus to orifices of cava inferior and hepatic vein is fully 15 mm. It therefore does not appear from these specimens that the anatomical basis for the double orifice of the cava inferior, or that a direct structural connection of the cava inferior through the limbus and valve of the foramen ovale into the left auricle, is substantiated.

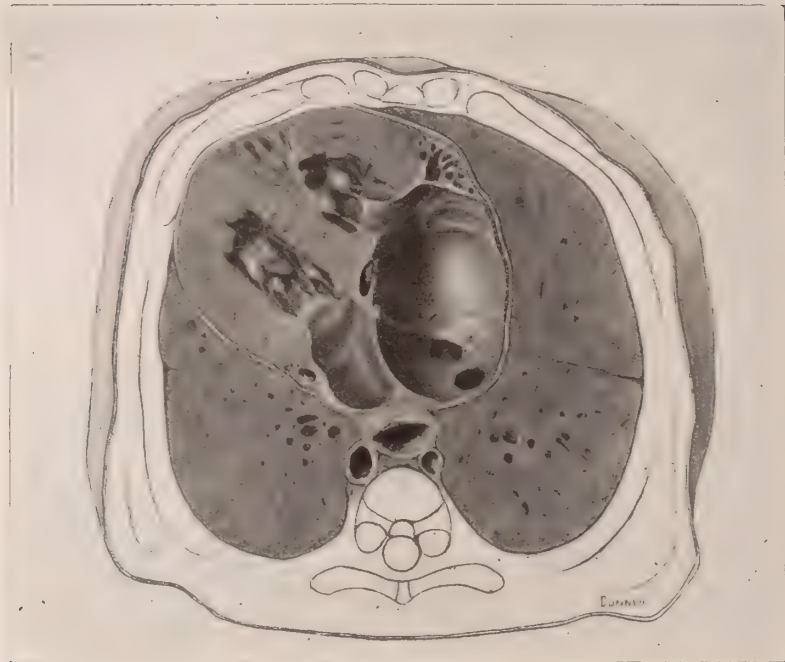


Fig. 13.

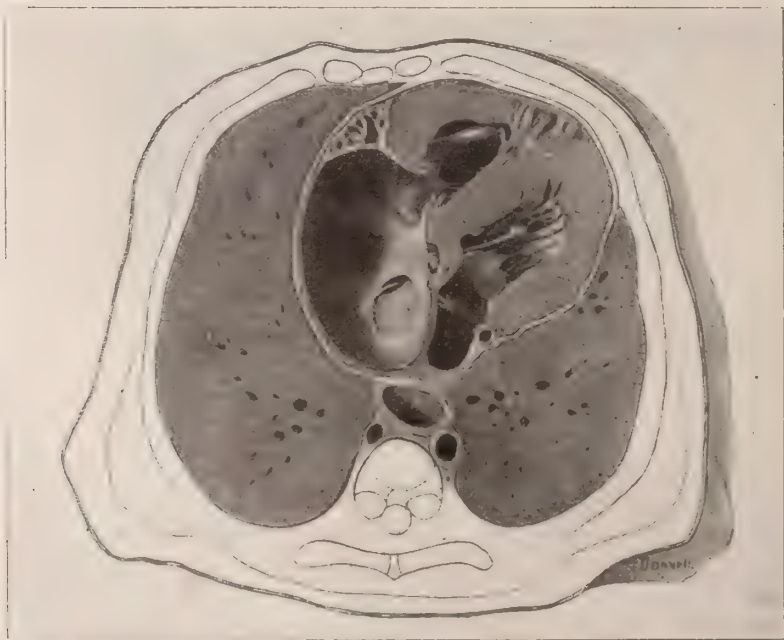


Fig. 14.

It would seem from the brief review of the phylogeny of the heart that the functional capacity of the fetal ventricles must be quite similar in birds and mammals. I will quote from Lillie's "Embryology of the Chick." "It is an interesting question to what extent the different kinds of blood remain separate and receive special distribution through the body. The blood poured in by the anterior venæ cavæ is purely venous, and it seems probable from the arrangement of the sinus valves that it passes into the ventricle of the same side, and so into the pulmonary arch and through the ductus Botalli into the dorsal aorta, and thus in part at least to the allantois where it is oxygenated. The blood coming in through the posterior vena cava is purified and rich in nutrition, for part of it comes from the allantois where it has been oxygenated, and part has passed through the renal portal circulation, where, no doubt, it has been purified of nitrogenous excretory matter, and the remainder is mostly from the yolk sac and hence laden with nutrition. The blood appears to be diverted through the foramen of the septum atriorum into the left auricle, and thence to the left ventricle, and so out into the carotids and aortic arch. It would seem, therefore, to be reasonably certain that the carotids receive the purest and most nutritious blood, for the blood in the dorsal aorta is mixed with the blood from the right ventricle. *There can be no reasonable doubt that the heart is a more effective organ for the separation and effective distribution of the various kinds of blood received by it than this account would indicate.* But further investigation is necessary to determine in what ways and to what extent this takes place." [Italics mine.]

The "foramen in the septum" should read "foramina," for a single opening in the auricular septum of birds does not occur to my knowledge. The description is after the old Sabatier plan which has held for so many decades, because it seems to explain something. It is interesting to note that the hind legs of the chick receiving the poorest (?) blood, once they start, rapidly outstrip the wings in development, and that in some birds one anterior vena cava opens in common with the posterior vena cava. The writer has under way a series of chicks from the eighteenth day through the hatching to determine this very point both structurally and experimentally.

The usual descriptions of the foramen ovale and its function are remarkable for the conception of the physics involved, only to be overshadowed by even more remarkable physics in the functional closure of the ductus. (See article by Fromberg.) It is my intention to report on the ductus side of this question when the developmental relations in the chick have been more thoroughly studied.

In review it may be stated:—

- (1) That the foramen ovale affords a connection from the right



auricle into the left and that it merely transmits blood from the right into the left auricle, irrespective of the source of this blood.

(2) That patency of the foramen ovale with ductus closed in an otherwise normal heart has no physiological significance.

(3) That the ductus cannot remain functionally patent if the foramen ovale is closed and the ventricular septum intact unless there is a tremendous compensation in the bronchial circulation or a relatively greater functional capacity of the right ventricle as in the cold-blooded forms.

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## STUDIES ON SULPHUR METABOLISM.

II. A STUDY OF THE ETHEREAL SULPHATES OF THE URINE IN  
DIABETES MELLITUS AND IN CANCER.

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## I. REVIEW OF THE LITERATURE.

Baumann<sup>1</sup> in 1876 was the first observer to show that urine contains sulphuric acid combined in ethereal combination with phenol. Previously Stædeler<sup>2</sup> found on distilling urine after acidifying with dilute acid that phenol could be recognized in the distillate, and Buliginski<sup>3</sup> and also Hoppe-Seyler<sup>4</sup> showed that the phenol of the distillate originated from a compound broken up by the acid. Baumann and Herter<sup>5</sup> claimed that the combination of sulphuric acid with phenol was a protective mechanism of the body, to detoxicate a toxic substance.

Since the above mentioned work, many results have been obtained as to the relation of the ethereal sulphates to the total sulphates of the urine in man. In round numbers the normal proportions may be stated as 1:10. Hoppe-Seyler<sup>6</sup> and Haldane<sup>7</sup> have made thorough studies of the ethereal sulphates of the urine in health and disease, and the results of these studies and the studies of others may be summarized as follows: The ethereal sulphates are increased in cases showing abnormal intestinal absorption, such as typhoid fever, typhus fever,<sup>8</sup> intestinal tuberculosis, peritonitis and chronic enteritis,<sup>10</sup> in cholera,<sup>9</sup> in cases of pus formation anywhere within the system, and in diseases of the stomach in which the food lies in the stomach a long time and undergoes fermentation.

The ethereal sulphates have for a long time been considered as a reliable index to the amount of absorption of products of intestinal protein putrefaction. There is no doubt that many cases of increased intestinal putrefaction show the presence in the urine of increased amounts of ethereal sulphates, especially the sulphuric compounds of indoxyl and skatoxyl. However, Folin<sup>11</sup> thinks that the ethereal sulphates can only in part be due to intestinal putrefaction, and neither their absolute nor relative amount can be accepted as an index to the extent to which the putrefaction is taking place in the intestines, and that the ethereal sulphates represent a form

of sulphur metabolism which becomes more prominent when the food contains little or no protein.

Combe,<sup>12</sup> on the other hand, claims that "leaving out organic sup-purations, the 'sulpho-ethers' are solely derived from the microbic intestinal putrefaction produced at the expense of the proteids, the nucleo-albumins, the pancreatic and intestinal juices, the bile and the intestinal mucus." He also thinks the quantity of the so-called 'sulpho-ethers' is proportional to the degree and intensity of the putrefaction taking place in the intestine.

Stern,<sup>13</sup> however, claims that the excretion of ethereal sulphates in the urine is not proportional to the intensity of the intestinal putrefaction, but is proportional to the power of absorption which varies greatly according to the individual.

Baumann<sup>14</sup> found only traces of ethereal sulphates in the urine of a dog fasting for a long period, and after disinfection of the intestines by means of large doses of calomel, he found that the ethereal sulphates, indols and phenols completely disappeared from the urine. These experiments, as well as those of Nuttall and Thierfelder,<sup>15</sup> speak in favor of Combe's idea. These workers showed that animals having a sterile intestine and fed on sterile food excreted a urine free from indol, skatol, phenol, cresol, pyrocatechin and ethereal sulphates. Morax,<sup>16</sup> by means of intestinal antiseptics, and Rovighi,<sup>17</sup> by means of intestinal lavage, diminished the intensity of putrefaction in the large intestines, and this was accompanied by a lessening of the amount of ethereal sulphates in the urine. Poehl,<sup>18</sup> Biernacki,<sup>19</sup> Hirschler<sup>20</sup> and Winternitz<sup>21</sup> obtained the same result by modifying the diet and giving only carbohydrates. Cohendy<sup>22</sup> and also Leva<sup>23</sup> found a lessened excretion of ethereal sulphates after the administration of lactic acid bacilli. Mester<sup>24</sup> showed that partaking of high or tainted foods greatly increased the proportion of the urinary ethereal sulphates. Hoppe-Seyler<sup>25</sup> found that a vegetarian diet diminished the ethereal sulphates of the urine, and Strauss<sup>26</sup> observed a decrease of more than one-half by adding 100 grm. lactose to the diet. Biernacki,<sup>27</sup> Matteoda,<sup>28</sup> and Winternitz<sup>29</sup> noted a decrease in the urinary ethereal sulphate with a milk diet; Poehl<sup>30</sup> showed that sour milk diminished the amount of urinary ethereal sulphates.

Rovighi<sup>31</sup> and Embden<sup>32</sup> found a decreased excretion in the ethereal sulphates by the use of kephir, and Rothmann, Gottwald and Krauss<sup>33</sup> and Hirschler<sup>34</sup> found a decreased excretion with a farinaceous diet.

Bunge<sup>35</sup> and many others have found the ethereal sulphates of the urine increased four times with a meat diet. Stadelmann<sup>36</sup> showed that the prolonged administration of sodium bicarbonate increased the urinary ethereal sulphates, and Wasbutzki<sup>37</sup> noted that in all gastric conditions with hypoacidity there was a considerable in-



crease in the excreted ethereal sulphates. Biernacki<sup>38</sup> showed that as soon as bile can no longer flow into the intestines, the ethereal sulphates are greatly increased, and Brieger,<sup>39</sup> as well as Gava,<sup>40</sup> and Bartoshevitch,<sup>41</sup> found in acute intestinal catarrhs with diarrhea that the ethereal sulphates are diminished, while they are increased with constipation.

In conditions of stagnation, Hoppe-Seyler<sup>42</sup> found an increased excretion of ethereal sulphates; Pfungen<sup>43</sup> also in cases of atony with stagnation of food in the upper portions of the intestines. Salkowski<sup>44</sup> found a great increase in ethereal sulphates of the urine in peritonitis and intestinal obstruction.

Harley,<sup>45</sup> after the removal of the large intestines in dogs, found that the total sulphates of the urine were the same as in normal dogs, but the ethereal sulphates were reduced one-half, showing that the intestinal putrefaction was much diminished. Emerson<sup>46</sup> mentions a case of extreme constipation where the ethereal sulphates composed 57 per cent. of the total sulphates. Wohlgemuth<sup>47</sup> has observed a case where all the sulphuric acid of the urine was in organic combination.

Other studies on the ethereal sulphates of the urine in the conditions mentioned have been carried out by Velden,<sup>48</sup> Mueller,<sup>49</sup> Magrangeas,<sup>50</sup> Salkowski,<sup>51</sup> von Noorden,<sup>52</sup> Steiff,<sup>53</sup> Stern,<sup>54</sup> Schmitz<sup>55</sup> and Kast.<sup>56</sup>

In diseases of the blood, the ethereal sulphates have been studied by Moraczewski,<sup>57</sup> Vannini,<sup>58</sup> von Stejskal and Erben,<sup>59</sup> Taylor,<sup>60</sup> Schmidt,<sup>61</sup> Rethers,<sup>62</sup> von Noorden,<sup>63</sup> Eckert,<sup>64</sup> Schmidt,<sup>65</sup> and others.<sup>66</sup>

The following tables contain the data I have obtained in the study of the ethereal sulphates of the urine in diabetes mellitus and in cancer. The patients received the ordinary hospital diet, unless otherwise stated. The urine was collected in twenty-four-hour periods, using thymol as a preservative. The total sulphur of the urine was estimated by Benedict's method,<sup>67</sup> the total and inorganic sulphates by Folin's method.<sup>68</sup> The ethereal sulphates were computed by subtracting the inorganic sulphates from the total sulphates.

It should also be borne in mind that our present idea as to the formation of the ethereal sulphates is that they are formed only by the bacterial destruction of protein as shown by Ellinger,<sup>69</sup> Mayer<sup>70</sup> and Jaffe<sup>71</sup> and are not formed in the tissues during the katabolism of protein as has been claimed by Blumenthal,<sup>72</sup> Blumenthal and Rosenfeld,<sup>73</sup> Lewin,<sup>74</sup> Carletti,<sup>75</sup> Reale,<sup>76</sup> Gilbert and Weil<sup>77</sup> and Maraczewski.<sup>78</sup>

TABLE NO. I.—THE ETHERAL SULPHATES OF THE URINE IN DIABETES MELLITUS.

Case No.	Date	Total Sulphur, gm.		Inorganic Sulphate Sulphur		Etheral Sulphate Sulphur		Per cent. of Total Sulphate Sulphur	Diagnosis and Remarks
		gm.	Per cent. of Total S.	gm.	Per cent. of Total S.	gm.	Per cent. of Total S.		
1	6/27	1.04	85.5	0.89	79.9	0.05	5.6	6.6	Diabetes mellitus with gangrene of toe; patient on strict anti-diabetic diet. Urine still contains sugar.
1	7/6	1.52	0.98	0.89	59.0	0.08	5.8	9.0	
1	7/7	1.16	0.83	0.74	64.6	0.07	6.8	9.5	
1	7/8	0.91	0.77	0.68	75.2	0.08	9.5	11.3	
1	7/9	1.20	0.89	1.02	85.4	0.04	3.7	4.2	
1	7/10	1.98	1.85	1.69	85.8	0.15	7.6	8.2	
1	7/11	1.31	1.15	1.12	85.6	0.02	2.1	2.3	
1	7/12	1.30	1.15	1.06	81.6	0.08	6.8	7.7	
1	7/13	1.01	0.86	0.77	76.5	0.08	8.6	10.1	
2	7/8	0.89	71.1	0.58	64.9	0.05	6.2	8.7	Diabetes mellitus. Strict anti-diabetic diet. Urine still contains sugar.
2	7/9	0.87	59.6	0.49	56.4	0.02	3.2	5.4	
2	7/10	0.58	0.47	0.38	83.4	0.01	2.8	3.4	
2	7/12	1.32	0.96	0.94	71.8	0.01	1.1	1.4	
2	7/13	0.73	81.9	0.59	80.0	0.01	1.9	2.3	
2	7/14	0.58	0.47	0.46	78.4	0.01	2.4	2.9	
2	7/15	0.75	83.1	0.62	81.4	0.01	1.7	2.1	
3	6/27	1.61	75.5	1.21	70.9	0.07	4.5	6.0	Diabetes mellitus with gangrene of foot. Strict anti-diabetic diet. Urine still contains sugar.
3	6/28	0.87	61.2	0.61	61.2	0.09	10.6	14.7	
3	7/6	1.68	71.1	1.10	65.7	0.09	5.4	7.6	
3	7/7	0.36	0.22	0.19	54.0	0.02	7.3	11.9	
3	7/8	0.45	0.24	0.19	41.9	0.05	11.2	21.1	
3	7/9	1.12	0.86	0.85	76.0	0.01	1.1	15.0	
3	7/10	1.20	0.98	0.89	74.3	0.09	8.1	9.9	
3	7/12	1.40	1.09	1.02	73.3	0.06	4.3	5.6	
4	7/6	0.84	94.0	0.76	90.4	0.03	3.6	3.8	Diabetes mellitus with gangrene of foot. Strict anti-diabetic diet. Urine is free from sugar.
4	7/8	1.12	93.8	1.03	92.4	0.01	1.4	1.5	
4	7/9	0.66	91.6	0.54	81.8	0.06	9.8	10.6	
4	7/10	0.88	94.8	0.76	86.5	0.07	8.3	8.7	
4	7/13	0.92	89.5	0.82	81.7	0.07	7.8	8.7	
4	7/15	0.41	87.8	0.36	71.2	0.06	16.6	24.4	
5	7/2	0.82	83.8	0.68	73.4	0.08	10.4	12.5	Diabetes mellitus with gangrene of foot. Strict anti-diabetic diet. Urine contains sugar.
5	7/7	0.75	82.7	0.62	81.2	0.01	1.7	2.1	
6	6/28	1.09	78.1	0.85	67.4	0.11	10.7	13.6	Diabetes mellitus. Strict anti-diabetic diet. Urine contains sugar.
6	7/1	1.34	69.8	0.93	63.2	0.08	6.5	9.4	
6	7/22	0.38	65.5	0.24	60.7	0.01	4.8	7.3	Diabetes mellitus. Fifty gm. bread tolerance. Urine free from sugar.
6	7/28	0.69	80.0	0.55	75.4	0.03	4.6	5.7	
7	6/25	1.97	63.1	1.24	57.0	0.12	6.1	9.7	
7	7/2	1.39	87.8	1.22	79.5	0.11	8.3	9.4	
8	6/29	0.92	78.8	0.72	68.1	0.09	10.7	13.6	
8	7/1	0.86	80.1	0.69	66.9	0.11	13.2	16.4	Diabetes mellitus. Strict anti-diabetic diet. Urine free from sugar.
8	7/3	0.92	78.3	0.72	68.5	0.09	9.8	12.4	
8	7/6	0.94	85.7	0.81	73.4	0.11	12.3	14.3	Diabetes mellitus. Fifty gm. bread tolerance. Urine free from sugar.
8	7/7	0.92	64.7	0.59	56.5	0.07	8.2	12.7	
8	7/8	0.92	79.0	0.73	69.2	0.09	10.7	13.4	Diabetes mellitus. Fifty gm. bread tolerance. Urine free from sugar.
8	7/9	0.98	76.8	0.75	68.2	0.08	8.6	11.1	
9	7/6	0.40	68.1	0.27	62.9	0.02	5.2	7.6	Diabetes mellitus. Strict anti-diabetic diet. Urine contains sugar.
9	7/9	0.33	73.8	0.26	70.4	0.03	9.4	11.8	
9	7/16	0.32	88.7	0.28	72.5	0.03	8.2	10.4	
9	7/18	0.27	80.7	0.30	72.0	0.03	12.5	17.0	
9	7/19	0.27	73.8	0.16	61.3	0.03	19.5	23.6	
10	7/26	0.19	83.8	0.16	64.3	0.03	8.1	10.0	Diabetes mellitus (mild).

TABLE No. II.—THE ETHEREAL SULPHATES OF THE URINE IN CANCER.

Case No.	Date	Total Sulphur, gm.	Total Sulphate Sulphur		Inorganic Sulphate Sulphur		Ethereal Sulphate Sulphur		Per cent. of Total Sulphate Sulphur	Diagnosis and Remarks
			gm.	Per cent. of Total S.	gm.	Per cent. of Total S.	gm.	Per cent. of Total S.		
11	7/3	0.78								
			0.25	32.1	0.16	21.0	0.09	11.1	36.0	Carcinoma of cervix. Phlegmon of abdomen.
12	6/30	0.83								
			0.61	73.9	0.55	67.0	0.06	6.9	11.3	Carcinoma of rectum.
13	6/27	1.33								
			1.06	79.7	0.96	72.4	0.09	7.3	9.1	Carcinoma of stomach.
13	6/28	2.84								
			2.19	77.1	2.09	73.8	0.09	3.3	4.3	
14	7/29	0.50								
			0.34	69.0	0.29	59.4	0.05	9.6	14.7	Carcinoma of lung. Metastatic from breast.
15	7/26	0.78								
			0.65	83.3	0.61	78.6	0.03	4.7	5.7	Carcinoma of cervix. Patient on Folia standard diet.
15	7/27	0.82								
			0.68	82.9	0.61	74.0	0.07	8.9	10.7	
15	7/28	0.60								
			0.50	82.7	0.39	64.4	0.11	18.3	22.0	
15	7/29	0.62								
			0.50	80.7	0.39	63.0	0.11	17.7	22.0	
15	7/30	0.78								
			0.65	83.3	0.61	78.6	0.03	4.7	5.7	
16	7/8	0.60								
			0.49	81.7	0.44	74.0	0.04	7.7	9.6	Carcinoma of breast and pulmonary tuberculosis.
16	7/21	0.62								
			0.51	81.7	0.44	73.9	0.04	7.6	9.6	
17	7/7	0.24								
			0.13	53.8	0.10	46.2	0.01	7.6	13.9	Cystadenoma of ovary with peritoneal metastases.
18	7/25	0.39								
			0.34	87.2	0.29	74.9	0.04	12.3	14.1	Carcinoma of stomach.
18	7/26	0.58								
			0.51	87.9	0.46	79.8	0.04	8.1	9.2	
18	7/27	0.55								
			0.49	89.1	0.42	78.2	0.06	10.9	12.2	
18	8/9	0.78								
			0.68	87.2	0.58	74.9	0.09	12.3	14.1	
18	8/15	1.08								
			0.94	87.3	0.83	77.0	0.11	10.3	11.7	
19	6/21	0.99								
			0.75	75.6	0.65	65.5	0.10	10.1	13.4	Early carcinoma of larynx. Constipated.
19	6/22	0.71								
			0.47	65.9	0.34	48.1	0.12	17.8	27.0	Calomel given.
19	6/28	1.82								
			1.2	62.8	0.68	55.9	0.18	10.0	15.2	
19	6/29	1.86								
			1.47	79.1	1.36	73.2	0.11	5.9	7.5	
19	6/30	1.44								
			0.67	46.8	0.56	39.1	0.11	7.7	16.5	
19	7/3	0.62								
			0.42	67.6	0.30	48.5	0.11	19.1	28.3	Constipated.
20	8/9	0.86								
			0.78	91.6	0.65	83.5	0.05	6.1	6.8	Carcinoma of glands of neck. Operated two months ago.
21	8/9	0.61								
			0.50	81.9	0.46	75.4	0.04	6.5	8.0	Carcinoma of larynx and esophagus. Gastrostomy on July 29.
21	8/12	0.90								
			0.63	80.8	0.46	75.4	0.03	4.0	5.9	
21	8/14	0.49								
			0.41	83.4	0.34	73.5	0.03	6.5	7.8	
21	8/15	0.78								
			0.58	73.5	0.48	62.2	0.04	9.0	9.0	
21	8/16	0.63								
			0.53	83.6	0.44	73.5	0.04	6.5	7.5	
22	6/22	1.02								
			0.71	70.2	0.61	60.5	0.09	9.7	13.8	Inoperable carcinoma of stomach.
22	6/23	0.45								
			0.35	77.6	0.29	64.9	0.05	12.7	16.4	
22	6/27	0.81								
			0.61	75.4	0.48	60.2	0.12	15.2	20.1	Constipated.
22	7/3	0.41								
			0.30	75.8	0.41	53.7	0.08	22.1	28.9	Constipated.
23	6/22	0.89								
			0.70	78.1	0.57	64.3	0.12	13.8	17.7	Inoperable carcinoma of stomach.
23	6/23	0.81								
			0.58	72.1	0.53	65.7	0.05	6.4	8.8	
23	6/30	1.64								
			1.28	77.9	1.19	72.8	0.08	5.1	6.5	
23	7/1	2.17								
			1.53	70.6	0.81	65.0	0.12	5.6	7.9	



## DISCUSSION OF TABLE NO. I.

The question of intestinal decomposition in relation to diabetes mellitus is one of great importance, on account of the fact that not only the onset of coma but the disease as a whole has been referred to its effects.<sup>79</sup>

It may be noted that the excretion of ethereal sulphates, in the 10 cases of diabetes mellitus studied, shows nothing characteristic of this disease, thus agreeing with the findings of von Noorden,<sup>80</sup> Moraczewski,<sup>81</sup> Strauss and Philippsohn<sup>82</sup> and Herter and Wake-man.<sup>83</sup>

In Cases 4 and 9 it may be noted that the ethereal sulphates were increased on the days of constipation.

## DISCUSSION OF TABLE NO. II.

A number of authors<sup>84</sup> have been able to demonstrate periodically increased excretion of certain of the types of ethereal sulphate compounds in the urine in cancer. The amount of ethereal sulphates in the urine in the 13 cases of cancer studied shows no marked increase except on the days of constipation. Case 19 shows very well the effect of calomel as regards decreasing the intestinal putrefaction and its consequent effect on the ethereal sulphates of the urine. On account of the large amount of neutral sulphur in some of these cases of cancer,<sup>85</sup> the amount of ethereal sulphate sulphur in percentage of the total sulphate sulphur is markedly increased.

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## SPECIAL ARTICLE.

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### 'LITTLE CLASSICS' PHYSICIANS MAY HAVE OVERLOOKED.

[The sketch presented this month is by Anton Tchekhoff, the lamented (he died at the comparatively early age of forty-four) and highly talented short-story writer whose fame rests on a structure that surely will withstand the onslaughts of derogatory criticism for some time to come, if, as generally happens in the case of the masters in the literary world, the tide should turn against him on account of his popularity to-day. Tchekhoff belongs to the newer Russian writers (he was born in 1860 and died in 1904), but his methods are old since they make for truth and for an exact photography of life in all its many phases, with the author completely in the background, and not for the means by which the reader will become cognizant of a new philosophy, a new and novel presentation of facts and—Utopian dreams. The sketch which follows is one of the author's best, and in it the reader will recognize at once those qualities which we have faintly suggested as old in the sense that truth is always old though its discovery be only of recent date. —LITERARY EDITOR.]

### THE RUNAWAY.\*

It was an endless affair. Pashka and his mother, drenched with rain, tramped mile after mile, first across stubble fields, then by soft woodland paths where yellow leaves stuck to his boots, and on and on till daybreak. After that he stood two hours in a dark entrance-hall, and waited for the doors to open. In the hall, of course, it was warmer and drier than outside; but even there the piercing wind carried the raindrops in. And as the hall slowly filled with patients, Pashka, wedging his way through the crowd, pressed his face against a sheepskin coat which smelt strongly of salted fish, and slumbered.

At last the bolt slipped, the door opened, and Pashka and his mother found themselves in the waiting-room. Yet another long delay! The patients sat on benches; no one stirred; no one opened his mouth. Pashka stared at the crowd, and likewise held his tongue, though he witnessed many ludicrous, inexplicable things. But once when a boy hopped into the room on one leg, he nudged his mother's side, grinned in his sleeve, and exclaimed—

"Look, mother—a sparrow!"

"Don't talk, child, don't talk!"

At a little window appeared the *feldscher's* sleepy face. "Come and give your names."

The waiting patients, among them the funny, hopping boy, crowded round the window. Of each the *feldscher* asked name and patronymic, age, village, dates of illness, and other questions.

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\*Taken from "The Kiss and Other Stories," by Anton Tchekhoff. New York: Charles Scribner's Sons. 1912.

From his mother's answer, Pashka learnt that his name was Pavl Galaktionoff, that he was seven years old, and that he had been ill since Easter.

When the names were entered there was another short delay; and then through the waiting-room walked the doctor, in white apron, with a towel on his shoulder. As he passed the hopping boy, he shrugged his shoulders, and said in a sing-song voice—

"You're a donkey! Now aren't you a donkey? I told you Monday, and you come on Friday! Don't worry yourself so far as I'm concerned, but if you're not careful, fool, you'll lose your leg!"

The hopping boy blinked, grimaced piteously as if asking for alms, and began—

"Ivan Nikolaitch, be so kind . . ."

"None of your Ivan Nikolaitch!" said the doctor teasingly. "I told you Monday—you should obey! You're a donkey, that's all."

The reception began. The doctor sat in his room, and called for the patients in turn. Now and then from the room came shrill exclamations, the sobs of children, and the doctor's angry exclamations—

"Don't howl. I won't murder you! Sit quiet!"

At last came Pashka's turn. "Pavl Galaktionoff!" cried the doctor. Pashka's mother at first seemed dazed, as if the summons were unexpected; but she recovered herself, took Pashka's hand, and led him into the doctor's room. The doctor sat on a table, and tapped mechanically with a mallet a thick book.

"What is the matter?" he asked, without looking at his visitors.

"My boy has a boil, *batiushka*, on his elbow," answered Pashka's mother; and her expression implied that she herself was suffering from Pashka's boil.

"Take off his clothes!"

Pashka, panting, untied his neckkerchief, rubbed his nose on his sleeve, and began to unbutton his coat.

"Woman! have you come to pay me a visit?" said the doctor irritably. "Why don't you hurry? Are you the only one waiting?"

Pashka hurriedly threw his coat on the floor, and, with his mother's help, took off his shirt. The doctor looked at him absent-mindedly, and slapped him on the bare stomach.

"Serious, brother Pashka," he exclaimed. "You have outgrown your corporation!" When he had said this, he sighed, and added, "Show me your elbow!"

Pashka took fright at a bowl of blood-tinged water, looked at the doctor's apron, and began to cry.

"For shame!" said the doctor mockingly. "He's big enough to get married, yet he begins to howl. For shame!"

Pashka tried to stop his tears. He looked at his mother, and his expression said, "Don't tell them at home that I cried at the hospital."

The doctor examined the elbow, pinched it, sighed, smacked his lips, and again felt the elbow.

"You ought to be whipped, woman!" he said. "Why didn't you bring him sooner? His arm is nearly gone! Look at him, idiot, can't you see that the joint is diseased?"

"It is you who know best, *batiushka*!" said Pashka's mother.

"*Batiushka*! the lad's arm is rotting off, and you with your *batiushka*! What sort of a workman will he make without arms? You'll have to nurse him all his life! If you've got a pimple on your nose you run off here for treatment, but you let your own child rot for six months! You people are all the same!"

He lighted a cigarette. While it burned away he scolded Pashka's mother, hummed a tune, shook his head rhythmically, and thought something out. Naked Pashka stood before him, listened to the tune, and watched the smoke. When the cigarette went out the doctor started, and said in a low voice—

"Listen woman! Ointments and mixtures are no use in this case; you must leave him here."

"If it must be so, *batiushka*, so be it."

"We must have an operation. . . . And you, Pashka, you must stay," said the doctor, patting his shoulder. "We will let mother go, but you, brother, you will stay with me. It is not bad here, brother! I have raspberry bushes. You and I, Pashka, as soon as we get better, will go and catch thrushes, and I will show you a fox. We shall pay visits together. Eh? Will you stay? And mother will come for you to-morrow."

Pashka looked questioningly at his mother.

"You must stay, child," she said.

"Of course he'll stay," said the doctor merrily. "There is nothing to argue about! I'll show him a live fox. We'll drive to the fair and buy sugar-candy. Marya Denisovna, take him upstairs!"

The doctor was certainly a merry, talkative man; and Pashka was attracted, all the more because he had never been at a fair, and wanted to see a live fox. But his mother? He thought the problem out, and decided to ask the doctor to let his mother remain with him; but before he could open his mouth the nurse was leading him upstairs. With mouth wide open, he looked around. The stairs, the floors, the door-posts, all were painted a beautiful yellow; and everywhere there was a tempting smell of fast-butter. Everywhere hung lamps, everywhere lay carpets; and brass water-taps projected from every wall. But most of all Pashka was pleased by his bed with its grey, shaggy counterpane. He felt the pillows and the counterpane, and came to the conclusion that the doctor had a very nice house.

It was a little ward with only three cots. The first was vacant, the second Pashka's; and on the third sat a very old man with



sour eyes, who coughed without cease, and spat into a bowl. From his bed Pashka could see through the open door part of another ward with two beds; on one lay a thin, very pallid man with a caoutchouc bladder on his head. A peasant, arms apart, with bandaged head, looking very like an old woman, sat on the other.

Having set Pashka on his bed, the nurse left him. She returned immediately with an armful of clothes. "These are for you," she said to him. "Put them on."

Pashka took off his old clothes, and, not without pelasure, arrayed himself in his new garments. After donning a shirt, a pair of trousers, and a gray dressing-gown, he looked at himself complacently, and thought how he would like to walk down the village street in his new clothes. Imagination painted his mother sending him to the kitchen garden by the river, to pluck cabbage leaves for the pig, while the village boys and girls stood round him and gaped enviously at his dressing-gown.

When next the nurse returned she brought two tin bowls, two spoons and two slices of bread. She gave one bowl to the old man, and the other to Pashka. "Eat!" she said.

When Pashka examined the bowl he found it full of greasy soup with a piéce of meat at the bottom; and again he reasoned that the doctor lived very comfortably, and was not half as angry as he seemed. He dallied over the soup, licked the spoon after each mouthful, and when nothing remained but the meat, cast a side-long glance at the old man, and felt envy. With a sigh, he began the meat, trying to make it last as long as possible. But his efforts were in vain; the meat vanished speedily. There remained only the bread. Bread without condiment is tasteless food, but there was no remedy; after weighing the problem, he ate the bread also. And just as he had finished it the nurse arrived with two more bowls. This time the bowls contained roast beef and potatoes.

"Where is your bread?" she asked. Pashka did not answer, but distended his cheeks and puffed out the air.

"You've gobbled it up?" said the nurse reproachfully. "What will you eat your meat with?" She left him, and returned with more bread. Never in his life had Pashka eaten roast beef, and, trying it now, he found it very tasty. But it disappeared in a few seconds; and again only the bread was left, a bigger slice than the first. The old man, having finished his dinner, hid his bread in a drawer; and Pashka resolved to do the same, but after a moment's hesitation, he ate it up.

After dinner he set out to explore. In the next ward he found four men, in addition to those he had seen from his bed. Only one drew his attention. This was a tall, skeleton peasant, morose and hairy-faced, who sat on his bed, shook his head incessantly, and waved his arms pendulum-wise. Pashka could not tear his eyes

away. At first the peasant's measured pendulum movements seemed droll, and made for the amusement of onlookers; but when Pashka looked at the peasant's face, he understood that this meant intolerable pain, and he felt sorry. In the third ward were two men with dark-red faces—red as if plastered with clay. They sat up motionless in bed, and, with their strange faces and nearly hidden features, resembled heathen gods.

"Auntie, why are they like that?" he asked the nurse.

"They are small-pox patients, laddie."

When Pashka returned to his own room he sat on his bed, and waited for the doctor to come and catch thrushes or drive to the fair. But the doctor tarried. At the door of the next ward the *feldscher* stood for a moment. He bent over the patient with the ice-bag, and cried—

"Mikhailo!"

But sleeping Mikhailo did not hear. The *feldscher* waved his hand, and went away. While waiting for the doctor, Pashka looked at his neighbour. The old man continued to cough, and spit into the bowl, and his cough was drawn-out and wheezy. But one thing pleased Pashka intensely. When the old man, having coughed, inhaled a breath, something whistled in his chest, and sang in different notes.

"Grandfather, what is that whistling in your inside?" asked Pashka.

The old man did not answer. Pashka waited a minute, and began again.

"Grandfather, where is the fox?"

"What fox?"

"The live one."

"Where should it be? In the wood, of course."

The hours slipped by, but no doctor came. At last the nurse brought Pashka's tea, and scolded him for having eaten the bread; the *feldscher* returned and tried to waken Mikhailo; the lamps were lighted; but still no doctor. It was already too late to drive to the fair to catch thrushes. Pashka stretched himself on his bed and began to think. He thought of the doctor's promised sugarcandy, of his mother's face and voice, of the darkness in the cabin at home, of querulous Yegorovna. And he suddenly felt tedium and grief. But remembering that his mother would come in the morning, he smiled, and fell asleep.

He was awakened by a noise. Men walked in the adjoining ward and spoke in whispers. The dim gleam of nightlights and lamps showed three figures moving near Mikhailo's bed.

"Shall we take him on the mattress, or as he is?" asked one.

"As he is. There's no room for the mattress. *Akh*, he's dead at a bad hour, heaven rest his soul!"

Then—one of the figures taking Mikhailo's shoulders, another his feet—they lifted him, and the folds of his dressing-gown hung limply in the air. The third—it was the woman-like peasant—crossed himself; and all three, shuffling their feet, tripping in the folds of the dressing-gown, went out of the ward.

The sleeping man's chest whistled, and sang in different notes. Pashka heard it, looked in fright at the black windows, and jumped out of bed in panic.

"Mother!" he screamed.

And, without awaiting an answer, he rushed into the adjoining ward. The lamps and nightlights barely banished the gloom; the patients, agitated by Mikhailo's death, were sitting up in their beds. Grim, dishevelled, haunted by shades, they looked like giants; they seemed to increase in size; and far away in a dark corner sat a peasant nodding his head and swinging his pendulous hands. Without seeing the door, Pashka tore through the small-pox ward into the corridor, thence into an endless chamber full of long-haired monsters with ancient faces. He flew through the women's ward, again reached the corridor, recognized the balustrade, and rushed downstairs. And there, finding himself in the waiting-room where he had sat that morning, he looked wildly for the door.

The latch rattled, a cold wind blew, and Pashka, stumbling, sped into the yard, in his head a single thought: to flee, to flee! He did not know the road, but felt that it was enough to run without cease and that he would soon be at home with his mother. The moon shone through the clouds of an overcast sky. Pashka ran straight ahead, dashed round a shed into the shrubbery, stood a second in doubt, then rushed back to the hospital and ran around it. But there he stopped in indecision, for suddenly before his eyes rose the white crosses of a graveyard.

"Mother!" he screamed, and turned back again.

And at last, as he dashed past the black, menacing building, he saw a lighted window.

In the darkness, the bright red patch breathed terror. But Pashka, mad with panic, unknowing whither to flee, turned towards it with relief. Beside the window were steps and a hall door with a white notice-board. Pashka rushed up the steps, and looked through the window. A sharp, breathless joy suddenly seized him. For there in the window at a table sat the merry, talkative doctor with a book in his hands. Pashka laughed with joy; he tried to cry out; but some irresistible force suppressed his breath, and struck him on the legs, and he staggered and fell senseless on the steps.

When he came to himself it was quite light; and the sing-song voice that had promised the fair, the thrushes, and the live fox whispered in his ear—

"You're a donkey, Pashka! Now aren't you a donkey? You ought to be whipped. . . ."



# MEDICAL AND SURGICAL PROGRESS

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## THE VERUMONTANUM AND ITS DISEASES.

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### A REVIEW OF RECENT LITERATURE.

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By HARRY G. GREDITZER, M. D., of St. Louis, and JOHN R. CAULK, M. D., of the Editorial Staff.

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The verumontanum, though minute, is well defined anatomically. Upon the posterior wall or floor of the prostatic urethra is a narrow longitudinal ridge, the crista urethralis. This crest begins at the uvula vesicæ and passes through the prostatic urethra, and either bifurcates or fans out at its distal end. On this ridge is an enlargement, the verumontanum. On each side is a slightly depressed fossa, the floor of which is perforated by numerous apertures, the orifices of the prostatic ducts, the ducts from the middle prostatic lobe opening behind. At the fore part of the verumontanum, in the middle line, is a depression, the prostatic utricle, forming a cul-de-sac. Concerning the colliculus itself, Lowsley, in a very recent investigation of 224 autopsy specimens of prostates, has made the following observations. The verumontanum, formed by the ingrowth of the Wolffian and Mullerian ducts, assumes various shapes and sizes at different points. The usual arrangement is for the upper end to rise abruptly from the floor of the urethra, the greatest height and width being at the point where the ejaculatory ducts and utricle open into the urethra, usually about .3 cm. below its upper end. From this point on, it tapers off gradually until its fibres become distributed among those of the floor of the urethra, and it disappears at its lower end by spreading out in four or five bands of tissue, some of which may become attached to the lateral walls of the urethra. Above, the fibres of the apex of the trigonum connect with the verumontanum and are seen to be arranged in several folds. The distance from the vesical orifice to the colliculus varies with the age, being .55 cm. in the first decade and increasing directly with the age to the sixth decade, when this distance is the largest, 1.85 cm. The length of the verumontanum in the first decade is 1 cm. During the second it increases to 1.5 cm. and at the third it assumes adult size, nearly 2 cm., and remains throughout life. Width and height follow rather closely the length in regard to reaching adult proportions, somewhat over .4 cm. in either direction, and about twice the dimensions of the structure in the first decade. The ejaculatory ducts pass obliquely through the prostate,

rising precipitously until they are within a short distance of the lumen of the urethra in the verumontanum, where they turn and course through the verumontanum, parallel with the axis of the urethra, finally opening laterally in such a manner that there are left thin flaps over their orifices, which act as valves on distension of the posterior urethra. They open on a level with the upper portion of the utricle, and in none of Lowsley's 224 cases did they open into the utricle. The mouth of the utricle is very small in the first decade, considerably larger in the second decade, and reaches adult size in the third. It varies greatly in size and shape; average adult size being .15 cm. The shape of the orifice is a longitudinal slit, which varies greatly as to width. At times the orifice is small and round; again the largest diameter is obliquely or transversely placed, and occasionally it is semilunar. The depth of this vestigial organ is rarely extensive; occasionally, however, it extends to the prostate, in which case it measures 1 cm. or over. During the first four decades it is less than .5 cm. in length but in later years it becomes a trifle more extensive. The normal verumontanum as seen through the urethroscope is about the size of a split pea, pale pink in color, lighter in hue than the neighboring mucous membrane of the prostatic urethra. Wolbarst describes it as generally resembling an enlarged glans clitoris or a small cherry. Sometimes it is dome-like, often cone-shaped with pointed or flattened peak, again bulbous or doorknob shaped. The ejaculatory ducts are not usually seen, but may appear flanking the utricular orifice or at the base or near the summit of the verumontanum. Often blood-vessels may be seen, crossing from side to side, or as Wolbarst observes, mounting the anterior wall only to disappear in the mucous membrane. The orifice of the utricle is seen as a darker rounded or oval opening, or mere slit on the anterior surface; exceptionally on the posterior surface. The walls of the verumontanum slope gracefully downward and laterally, forming sulci, beyond which the urethral walls rise in a continuous lateral curve. The colliculus is seen often to lose itself anteriorly in several longitudinal folds. Very recently this small organ has been examined histologically by Rytina, who completely excised it on 18 different occasions. Its consistence is fairly firm, and from the surface would seem to be homogeneous, but on examining the base, it is noticed to be composed of two distinct structures, separated by a dense pearly-white circular capsule. The central portion comprises about 1/4 to 1/3 of the whole, has a yellowish color, a loose, spongy, lobulated character, and projects over the base of the organ. In its centre is a minute aperture. A fine probe, easily admitted, extends through and comes out at the opening of the sinus pularis above. The outer portion comprises about 2/3 to 3/4 of the organ, of fine texture, close and more or less homogeneous. Microscopical study enabled Rytina to differentiate the verumontanum into a central glandular portion and a peripheral stroma. The surface is covered by stratified, squamous epithelium, similar to that seen on the surface of the posterior urethra. Below this is a layer of connective-tissue stroma. Deeper down are groups of glands showing intracinous proliferations. These are composed of several layers of cells, simple cuboidal, columnar or squamous type. A fine supporting stalk may be seen at times. No corpora amylacea are seen and the lumina are empty. The anterior portion is composed of fibrous



tissue stroma, containing an occasional acinus. The capsule is composed of dense circular bands of fibrous and elastic tissue. It is arranged in long, wavy strands and is especially rich in the capsular portion. From here it extends inward, forming part of the stroma, walls of the acini and stalks of the infoldings. The verumontanum is poor in involuntary muscle fibres and nerves, but plentifully supplied with blood-vessels and lymphatics. The observations of Rytina show the sinus pularis to be a long canal, lined by squamous epithelium and ending in a complicated system of invaginations. These infoldings are lined by the same type of epithelium as the glands.

The functions of the verumontanum are as yet a matter of apparent controversy and deliberation, no one having settled indisputably any of the questions. Wolbarst asserts that little or nothing is said of the physiology in the literature, except that this organ is supposed to be the seat of sexual feeling. According to Cole, the secretion from the seminal vesicles mixes with that from the prostate gland in the sinus pularis. By distension the verumontanum prevents the back flow of semen into the bladder. Sensitiveness is marked in the prostatic urethra in health, especially so in disease, and the passage of an instrument through this part of the urethra at times may produce shock. The patient becomes pale, is nauseated and may faint, more often after getting off the table and on his feet. That the colliculus plays an important rôle in the sexual act is beyond doubt, and is proved by frequent erections during acute posterior urethritis, the full or partial erection subsequent to instillations of  $\text{AgNO}_3$  into the posterior urethra, the tendency to erection following instrumentation, and the morning erection when a full bladder is distending the posterior urethra, according to Townsend and Valentine. Regarding the urinary function, the verumontanum may be called the centre, not on the basis of any exact knowledge of the physiological action, but because of the common occurrence of frequency in verumontanitis and prostatitis. A peculiar circumstance is the quick wave-like contraction originating in the posterior urethra, and passing down the canal transmitted to the instrumenting hand, at the moment of application of an irritant to the colliculus, simulating the piston stroke occurring normally at the end of urination.

Concerning the etiology of disease of the verumontanum and deep urethra, practically all observers are agreed that gonorrheal infection of the posterior urethra is the prime factor. Randall reports this infection as the primary cause of the verumontanal symptoms of frequent nocturnal pollutions in 43 per cent. of his cases and excessive masturbation in 21 per cent. He adds that true cases of verumontanitis give a history of sexual misdemeanor or antecedent irritative infection. Townsend and Valentine give as causes of colliculitis, masturbation, sexual excesses, habitual coitus, condomnatus, reservatus, interruptus, and chronic posterior irritants. To these Cole adds prostatic calculi. Age as a factor is of some importance, the majority of cases occurring at about the third decade. Occupation is of no evident importance. Bachelors and widowers are frequently affected.

The symptoms of colliculitis are inseparably combined with those of chronic prostatitis and vesiculitis. They may be grouped into the sexual, urinary, and referred. Among the more common sexual

symptoms are disturbances of erection and ejaculation—namely, weak or unstable, incomplete or absent erections. The opposite state of frequent and prolonged erections without adequate stimulus generally precedes, and later sexual desire may be lost. Ejaculation at first is premature, later may be delayed, often bloody or painful. Randall calls attention to the occurrence of repeated nocturnal pollutions. Disordered nervous states are not uncommon. Of frequent occurrence are the referred symptoms, especially pain, which may be dull and aching, or sharp and cutting at times, simulating renal colic, or of a burning character. It occurs in various locations, commonly sacral, urethral, especially the distal inch, less often scrotal, testicular, inguinal, or suprapubic. A sense of fulness and heaviness in the urethra, or reflected to the perineum or rectum, particularly after coitus, is common. Pruritus ani is not uncommon. A symptom mentioned by Caulk is herpes progenitalis, not characteristic, but generally associated with chronic prostatitis and verumontanitis. Recently in an individual complaining of a feeling of burning and itching of the head of the penis, an attack of herpes was foretold; at this time there was no lesion externally. An endoscopic examination disclosed a band of vesicles stretching across the verumontanum, midway between base and apex and surrounded by an inflammatory areola. Urinary symptoms are numerous and troublesome. Discharges containing mucus, epithelium and pus may be present; shreds are inconstant. Frequency with an effort to expel what seems to be the last drop of urine, often accompanied by a terminal drop of blood, though not pathognomonic, is very suggestive. The patient may complain of pain in the localities mentioned during or after urination. Precipitate urination is regarded with suspicion by McCrae. Urination may be urgent or slow, impeded and with a small stream, and in case of hypertrophy of the verumontanum, retention may occur, as observed by Orłowski. There may be a constant residual urine, at times very large and endangering the upper tract, as in a case of cyst of the sinus pocularus (Cunningham). Colliculitis is often accompanied by a train of symptoms which have been grouped under the term neurasthenia.

Most observers agree that an inflamed verumontanum is enlarged, red, tender and irregular or edematous and bleeds easily. Randall, in a study of cases of nocturnal pollutions, has had the universal experience of finding, on endoscopic examination, varying degrees of pathological changes in the walls, either of the urethra, or more frequently of the colliculus itself. At times it has a raspberry appearance, covered with granulations. Actual ulceration, localized and circumscribed, is occasionally seen. Polyps, retention cysts of the utricle, ejaculatory or prostatic duct orifices have been noted. In some cases recorded by Randall, there are observed on the colliculus, smaller areas of darker red tissue which appear to be translucent, flush with the surface, but not covered with normal mucous membrane. Histologically they are formed by glandular hyperplasia. Lowsley has reported a band-like obstruction at the lower end of the verumontanum due to maldevelopment. Histologically, the only type of pathological verumontanum that has been studied is the infectious, described by Rytina. There occurs a submucous and a periacinous infiltration of round cells and pus cells. At times there can be seen in the interior of the acinus round cells, pus cells or desquamated epithelial cells, and in places round cell infiltration



may completely replace an acinus. Occasionally red blood cells may be seen. Sections show infection traveling down the length of the utricle into the invaginations below.

The desirability of endoscopic inspection of the urethra prompted several early attempts to illuminate the urethra. The idea was conceived by Bozzini in 1806. Other pioneers were Sekalas (1826), Fisher (1827), Avery (1843), Haken (1853). Désormeaux in 1853 is said to be responsible for the first practical instrument, as well as a treatise on endoscopy. In 1877 Nitze introduced a novel method of lighting. Inside the tube he placed a small brass tube containing a platinum wire which projected a short distance beyond its container. An electric current passing along the platinum and returning by the brass heated the platinum to a red glow, which illuminated the interior of the urethra. The apparatus had to be kept cool by circulating water. Rytina finds mention of diseases of the verumontanum as far back as 1879, when Grunfeldt, in the first complete book published on urethroscopy, devotes a large chapter to diseases of the verumontanum. In 1882 Burckhardt recommended several therapeutic measures—namely, silver nitrate applications and the thermocautery in treatment of verumontanitis. Instruments devised for study of the posterior urethra have been many and of various models. They may be grouped into four classes, depending upon whether the lighting arrangement is internal or external and upon the distension of the posterior urethra, whether by air or with water. Among the later instruments is Goldschmidt's, built on the principle of the irrigating cystoscope. Buerger's cystourethroscope is an improved type of the above pattern. The bladder as well as the whole surface of the posterior urethra can be inspected. Objections to water-circulating urethroscopes are (1) the rendering of the mucosa a universal paleness, so that one of the main diagnostic appearances is lost, and (2) the inability to make topical applications. The Wassidlo urethroscope is so constructed that the urethra can be lightly distended with air if desired. Luys recommends the use of the instrument he employs for the anterior urethra, a straight tube, the difference being that it is longer. Objections have been made that the introduction of a straight tube is painful and may cause profuse hemorrhage, dimming the field of vision. Jacoby, by an ingenious modification of Goldschmidt's instrument, produces a double picture, one direct and the other reflected from a mirror advantageously placed in the tube, so that one obtains a view of not only the top and anterior surface of the verumontanum, but also the posterior surface and the supramontane urethra. A simple and practical instrument for ordinary purposes is the Young-Squier modification, consisting of a straight tube, of diameter to fit the canal, slightly funnel-shaped and tapering toward one end, where it is continuous with a bullet-pointed obturator to facilitate introduction. The flaring end has a darkened flange. Illumination is secured by an external incandescent light. Through this tube such instruments may be introduced and manipulated as probes, utricle syringes, knives, cauteries, scissors, alligator forceps and curettes, carriers of small cones of silver nitrate and cotton swabs. Blood, urine or irrigating fluid interfering with vision can be removed by means of a Kollmann suction pipette or with cotton swabs. A modification of this instrument with a movable inner cutting tube can be used to excise the verumontanum. The technique of the ex-



amination is worthy of a few comments. Asepsis must be observed to an exact degree. All instruments, excepting lighting apparatus, are boiled. The patient is prepared as for a cystoscopic examination, with the exception perhaps of dispensing with a local anesthetic; the operator's hands are well disinfected. Emphasis is especially placed on gentleness and careful manipulation throughout the procedure.

The treatment of verumontanitis is as a matter of course local and always combined with measures directed toward the cure of the accompanying prostatitis and seminal vesiculitis, such as prostatic massage, deep instillations, dilatations, applications or surgical procedures. The most common application used is a solution of silver nitrate, varying from 5 to 50 per cent., applied by means of cotton swabs. Pure fused  $\text{AgNO}_3$  is used by means of a small tip held in an applicator, or the silver is fused on the end of a probe. Tincture of iodine has been recommended. Hawkins uses a preparation of oil, by swab or syringe, containing automobile cylinder oil 7 parts, charcoal filtered and not clarified by acids, and oil of eucalyptus 1 part. Between treatments he uses instillations of oil with an Ultzmann syringe, or irrigations of 8 drops of  $\text{HNO}_3$  to the litre of water. Townsend and Valentine recommend the use of saturated solutions of picric acid or varying strengths of chromic acid as topical applications. Treatments are given at intervals of from five to twenty-one days. Among the surgical procedures mentioned are electrolysis, cauterization with the high frequency, or application of the actual cautery. A small curette or punch may be used to advantage, and the utricular syringe of Geraghty is convenient for aspiration of the infected contents of the utricle. Puncture of cysts of the verumontanum is efficacious when these exist and are small enough. A small alligator forceps is used for biting off bits of granulation tissue or papillary growths, and a urethral knife at times to lay open the sinus or verumontanum for better drainage. Complications arising from treatment of the verumontanum, such as epididymitis, cystitis, urethritis, prostatic abscess and severe urethral hemorrhage, as well as cicatricial obliteration of ejaculatory ducts, with resulting sterility or painful ejaculation are not frequent, but these possibilities have led Rytina to a more radical procedure—that of completely excising the verumontanum, which he claims is done with much less risk, less pain and reactive symptoms, and gives an opportunity for more thorough histological study, and will be a basis for more rational therapy in the future.

## THE ENDONASAL OPERATION ON THE LACHRYMAL SAC.

## A REVIEW OF RECENT LITERATURE.

By WM. B. CHAMBERLIN, M. D., of the Editorial Staff.

1. Mosher (*Laryngoscope*, November, 1915, p. 739).
2. Onodi (*Monatschr. fuer Ohrenheilkunde und Laryngo-Rhinologie*, Vol. 46, Hft. 4).
3. West (*Berl. klin. Wochenschr.*, 1914, Vol. LI, p. 1633; *Archiv fuer Laryngologie und Rhinologie*, 1913, Vol. XXVII, pp. 224 and 504; *Berl. klin. Wochenschr.*, 1913, Vol. L, p. 926).
4. Yankauer (*Laryngoscope*, 1912, Vol. XXII; *Trans. Amer. Laryng., Rhin. and Otol. Soc.*, 1913, Vol. XLX, p. 294).

Until a few years ago, according to West, the treatment of dacryostenosis had made no real progress for a period of twenty-five years. In 1910 he published his paper entitled "The Window Resection of the Naso-Lachrymal Duct," and exhibited in all 7 cases operated by this method. This paper, as the title indicates, referred only to the operation upon the duct, but laid no claim to being an endonasal operation upon the sac. In 3 of the cases, however, the sac itself was really opened. The author soon became convinced that the opening of the nasal duct alone could not be sufficient and that any operation, to be successful, must concern itself rather with the opening of the lachrymal sac as well. He immediately set himself about the new task, and, through the generosity of Professor Silex, of Berlin, gained access to an exceedingly rich clinical material. The results of his later endeavors he published in the *Archives of Laryngology and Rhinology*, in 1913. At that time, he reported the investigation of over 300 cases of various diseases of the lachrymal apparatus, and the operation upon the lachrymal sac in 130 cases by the endonasal method. He claimed a favorable result in over 90 per cent. of the cases so operated upon.

West asserts that Caldwell was the first to open the lachrymal canal, in 1893, when he reported one case. Still later, Killian and Passow reported similar cases. The idea of reestablishing the connection between eye and nose, as a passage way for the tears, was known to the ancients, who were for the most part unsuccessful in their attempts. In 1868, Berlin had revived the extirpation of the sac from without, and this had remained the operation of choice almost to the present. In 1904, Toti published the results of his attempts to reestablish the natural pathway from without by means of a skin incision at the inner angle of the eye. In 1910, von Eiken published a paper in which the approach to the sac by way of the antrum was advocated. West performed his first operation in 1908.

The various operations, previously described, had been successful only in a relatively small proportion of cases. The external oper-

ations often gave rise to fistulæ and, if successful, as far as the curing of a phlegmon was concerned, necessitated later the excision of the lachrymal gland to get rid of the epiphora. The resulting scar, too, was unsightly. West's earlier operations on the nasal duct were also unsuccessful, because the stenosis occurred at the inferior border of the sac, where it joins the duct. The operation was, accordingly, inferior to and outside the field of the real difficulty in a large proportion of cases.

West's modified operation concerns itself with the lachrymal sac alone, the duct being disregarded. The free opening of the sac itself he regards as essential, if a cure is to be expected. That the sac is really opened in all cases is shown by the fact that a probe introduced into the lower punctum passes horizontally into the nose. A minute knowledge of the anatomy of the parts is absolutely essential. The technique is as follows. A quadrangular flap, covering the end of the lachrymal sac, and extending well forward over the ascending process of the superior maxilla, is resected sub-mucously, its base of attachment being inferior. After its resection it is turned downward out of the field of operation, this inferior attachment acting as a hinge. The denuded area extends vertically through a space roughly limited by an anterior extension of two lines; the upper marking the attachment, and the lower the inferior border of the middle turbinal. Neither turbinal is encroached upon, unless an obstructing hypertrophy is present. By means of appropriate chisels, a portion of the posterior border of the nasal process of the superior maxilla is chipped away and the thin bone, covering the sac, resected. The sac itself is then grasped with forceps and a large portion of its nasal aspect resected with a thin scalpel. The sub-mucous flap is now replaced—the posterior part, over the area of the resected sac, being first removed. The flap is held in position for twenty-four hours by packing of iodoform gauze. The after-treatment is exceedingly simple, and consists in keeping the nose free of crusts and granulations, and irrigating the sac by way of the canaliculus with a 3 per cent. solution of boracic acid. As before stated, West claims favorable results in 90 per cent. of his cases.

The advantages of West's, over the previous methods, for the treatment of the various diseases of the lachrymal apparatus, he enumerates as follow:—

1. The physiological function of the path for the tears is again restored, so that, not only a suppuration of the sac, a lachrymal fistula, or a phlegmon is healed, but the tears flow normally through the nose. A later epiphora is accordingly avoided.

2. A so-called cure by probing is rendered unnecessary.

3. The lachrymal gland is spared.

4. A skin incision or a curetting from without, with eventual scar formation is avoided.

This operation he has performed on every possible sort of disease affecting the lachrymal apparatus.

After the operation certain individuals, by sharply blowing the nose, can force air out through the canaliculus. West does not consider this a disadvantage, as the patients do not complain of it. Halle's suggestion for forming a valve of the mucosa, in order to prevent this, he regards as impossible of accomplishment.

A more recent endonasal operation upon the lachrymal sac is



that of Yankauer. The latter considers the West operation unsatisfactory because of the tendency of the opening in the middle meatus to close—such objection being avoided by his improved operation.

In the operation of Yankauer, the horizontal incision is begun at the attachment of the anterior end of the middle turbinal and carried forward for a distance of 5 mm. It is then carried downward to the anterior border of the inferior turbinal, and backward along its inferior, free border, for about 2 cm. or one-third to one-half the length of the turbinal. The incision is carried well down to the bone and the roughly rectangular flap, thus outlined, resected sub-mucously, its posterior attachment acting as a hinge. On this hinge it is folded backward and held in place by tucking it under the anterior free end of the middle turbinal. A part of this sub-mucous resection consists of the mucous membrane and periosteum on both sides of the anterior end of the inferior turbinal to a point well back of the opening of the nasal duct. The bony portion of the inferior turbinal, so uncovered, is then resected with punch forceps. The bony covering of the canal and sac is now removed with chisel and punch forceps, and the canal at its extreme posterior aspect slit from the opening in the inferior meatus to a point well above the junction of the inferior portion of the sac with the duct. Where the sac is found to contain pus, a portion of its inner wall is resected to allow for free drainage into the middle meatus. This opening into the middle meatus closes subsequently. The internal wall of the duct and sac are now folded forward and held in position by folding the previous sub-mucous flap down upon it. This latter flap is held in position by a single stitch as well as by packing. The subsequent treatment consists in removing the packing after twenty-four hours, and irrigations through the lower punctum—the nose, of course, being kept free of crusts while healing is taking place.

Yankauer reports in all 9 cases operated by this method, during a period of three years. "Two were cases of mucocele of the sac; the other 7 were suppurative. The suppuration ceased in all cases after the operation and has not recurred in any of them. The epiphora was relieved in all but one of the cases."

The most recent operation devised is that of Mosher. This method of opening the sac and duct was come upon, as it were, by accident from an observation of the specimens on the cadaver in the development of the author's operation on the ethmoid labyrinth and frontal sinus. After removal of the anterior end of the middle turbinal and free exposure of the processus uncinatus, the author's stiff probe is introduced through the duct into the inferior meatus, the canaliculus having previously been slit. A roughly rectangular flap, limited anteriorly by the posterior tip of the ascending process of the superior maxilla and a portion of the superior border of the inferior turbinal, superiorly by the extreme limit of the middle meatus, and posteriorly by the extreme inner tip of the uncinate process, is now resected sub-mucously and deflected downward and backward.

The inner wall of the lachrymal cell and bony covering of the duct are now broken through with an appropriate curette, the nasal process of the superior maxilla acting as a guide anteriorly. The fragments are removed with a conchotome. The inner wall of the

duct and sac are now broken through by slowly withdrawing the probe, at the same time turning its tip sharply inward toward the septum. The probe is then reintroduced and serves as a guide to the curetting away of the posterior tip of the ascending process of the maxilla, as well as the upper part of the processus uncinatus. The canal is subsequently widened by biting forceps after the probe is withdrawn practically to double its previous width. A ligature is then passed through the nose upward and out through the dilated punctum—a piece of gauze being attached, kite-tail fashion, to its middle. This gauze is then drawn upward into the lachrymal sac and the ends of the ligature fastened to the face with adhesive. The flap is now replaced.

After-treatment consists in removing the plug after two or three days, keeping the nose free from granulations and crusts, and keeping the passage free by passing the probe wherever it is indicated. The author asserts that the probe can be passed either from the nose or the inner canthus. The operation "has been abundantly tried on the cadaver and three times on the living." The author admits that "it is too soon to say much about the results on the living, except that, so far, they are good."

From a review of the foregoing methods and operations it would seem that in the development and perfection of the endonasal method a possible solution of a difficulty, which has long been a perplexing one, may be reasonably expected. Certainly the external operation and its after-results have left much to be desired. The endonasal route obviates many of the disadvantages of the external operation. Whether the physiological pathway for the tears into the nose can be maintained permanently in a sufficient percentage of cases at the hands of the average rhinologist is a question which time alone can answer.

## PHONASTHENIA.

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By LOUIS K. GUGGENHEIM, M. D., of the Editorial Staff.

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13. Imhofer: Die Ermuedung der Stimme (Phonasthenie). Monograph. 1913.
14. Zumsteeg: Phonasthenia. (*Archiv. fuer Laryngologie*, Bd. 24, p. 1.)

Everyday occurrences frequently assume over night, as it were, a rôle of great importance when handled analytically. We are surrounded by so many things that we do not understand we are forced to take most of them for granted. We get used to them and cease to worry over them. They become as much a part of our everyday life as the penny paper. Suddenly, somebody takes the trouble to explain one of these occurrences, gives it a new name, and the existence of the thing is immediately doubted by the majority who refuse to believe that so 'unusual' a thing could possibly exist. A notable example of this is the work of Freud. The neurotic fear is the negative of the unconscious desire, writes Freud. Ridiculous, says some eminent psychologist. Neurotic fear is a manifestation of the remains of a primitive instinct which was a



necessary safeguard to the prehistoric man against a sudden attack by the enemy. The eminent psychologist, however, has long ago accepted as an explanation of the old maid looking under the bed a couple of times before retiring, the old maid's desire for a man; the fear arising from the unconscious desire which seems so very very wicked to the old maid and so perfectly incompatible with her conscious ego. The fear is really a fear that the desire will be indulged, so the conscious mind frees itself of its 'horrifying' state by making perfectly sure that no man is there. Just as Freud has created a marvelous therapeutic system from keen observations of everyday occurrences, so Flatau has transformed our old friend, 'clergyman's sore throat' and allied conditions into phonasthenia, and has thereby placed this frequently occurring affection upon a scientific basis, and, most important of all, has given us a rational therapy. In every large city in the world there are many 'has-beens' who give vocal instruction for very moderate remuneration. Let us study one case. Professional singing became impossible for the artist because the larynx simply refused to carry out cerebral orders. The doctor said the vocal cords were congested and roughened, and that an astringent treatment was indicated; so treatment was carried out until the patient tired of being choked with laryngeal injections and applications, and became discouraged because there was no improvement and therefore no hope of getting back to professional work. There was nothing to do but join the ranks of those who eke out an existence trying to produce voices in young 'hopefuls' where voices are not. In a few cases there is improvement and a return to work; but sooner or later comes the final breakdown and necessity of retiring. The public speaker who finds that he cannot speak as long and as comfortably as formerly begins the water-gulping and throat-clearing performance which is so delightful (?) an accompaniment to the lecture, sermon or speech. After a while even water and throat clearing do not help very much, and the speaker suffers from a burning sensation alternating with actual pain during and for hours after speaking. Finally, if he is foolish enough to persist, comes the phonic collapse. During a speech the cords suddenly refuse to produce a sound; the speaker is horrified and turns pale; cold sweat appears on his brow. If strongly constituted he does not faint but merely points to his throat and sits down; if neurotically inclined he goes to pieces, as it were; fainting or weeping as the case may be. The next day he goes to the doctor who tells him he is 'run down,' needs a rest and a tonic. If he consults a laryngologist a diagnosis of chronic laryngitis is made and local treatment advised. After a while the condition improves and the speaker returns to his work only to suffer, within a short time, a recurrence of his symptoms. Again and again he is treated and again and again the condition recurs; each time a shorter time elapses between attacks. Finally, the voice becomes so hoarse and speaking so difficult that he gives up his work for always.

Not infrequently army officers suffer from voice disturbance, which in some instances is so marked as to force the individuals to take up other work. The singer's condition is phonasthenia; the speaker's—rheseasthenia; and the commander's—kleseasthenia. All three conditions may be designated as phonasthenia, which in the more limited sense is applied to the disturbance in the singer's

voice. It was not until Flatau, in 1906, described phonasthenia as a definite disease entity that we realized that this condition differs from other forms of chronic laryngitis. It remained for Imhofer to present a monograph upon the subject which is a classic in completeness and scientific value. The first chapter Imhofer devotes to an historical sketch in which he gives Flatau full credit for having first described the symptom-complex of phonasthenia. The second chapter is devoted to the clinical picture and nature of the affection. The early symptoms are (a) marked fatigue of larynx and pharynx, due to chemical changes in the muscles and to psychical influence; (b) pain in larynx and pharynx during and after use of voice; (c) disturbance of intonation. The later symptoms are (a) inability to sing any tone correctly (in the case of the speaker and commander—marked hoarseness); (b) the final scene of the tragedy—phonic collapse. The changes in the larynx are a gradually increasing congestion followed by marked pathological changes in the cords, etc.

Phonasthenia, according to Imhofer, is due to the use, by singers and speakers, of tone levels above the normal voice range. This necessitates pressing the cords together (*coup de glotte*), thereby expending more energy than should be necessary to produce the tone. This constant use of the *coup de glotte* irritates the cords and leads sooner or later to the changes above noted. The remaining chapters are devoted to the report of cases, diagnosis, prognosis and treatment; the latter consisting of rest, electric compensation for detonation, and a limited amount of local medication. Before treatment is instituted the normal range of the patient's voice is determined as accurately as possible under existing conditions, and the patient told that in the future the voice activities must absolutely be limited to the normal range, else the condition will recur.

## DIAGNOSTIC AND THERAPEUTIC NOTES.

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A NEW SYMPTOM OF DUODENAL ULCER.—Stern (*Arch. of Diag.*, 1915, No. 4). The symptom is both of an objective and subjective nature. It is subjective because it is a reaction to pyloro-epigastric discomfort or pain; it is objective because it is visible evidence that the patient voluntarily or involuntarily assumes that posture which gives him most comfort.

This posture constitutes the sign or symptom. The patient, trying to stretch out his epigastrium on account of the relief obtained thereby, often prefers standing to sitting; when in discomfort while resting upon a chair he sits in a slanting position in such a manner that chest, abdomen and legs form a perfect incline. When experiencing discomfort while in bed, the patient tries to lie as straight as possible, often on the left, but never on the right side.

The symptom or sign is of special value in differential diagnosis. It is not present in gastric ulcer. In gall-stone colic, the patient usually lies on his left side with legs drawn up. In appendiceal colic, as well as in the common affections of the cecum and the colon in general, the body of the patient when sitting is bent over; when lying, his legs are more or less flexed.

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TUBERCULIN IN TUBERCULOUS MENINGITIS.—Bacigalupo (*Muench. med. Wochenschr.*, 1915, No. 7). The writer reports 2 cases of tuberculous meningitis in which recovery followed the intradural injection of tuberculin. In both cases the diagnosis was established by finding tubercle bacilli in the spinal fluid. The initial dose, for a child three years old, was 0.001 tuberculin diluted with the patient's own cerebrospinal fluid. A second injection, somewhat larger, may be given twenty-four hours later. When given in this manner, tuberculin does not cause a rise of temperature, but rather a fall. The method obviously requires confirmation, but is of interest in view of the hopelessness of the outlook with other methods of treatment.

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A CHEMICAL AID IN SECURING THE SPIROCHETA PALLIDA FROM SYPHILITIC LESIONS.—Lloyd (*Boston Med. and Surg. Jour.*, December 16th, 1915). The method in use at the Massachusetts General Hospital for obtaining the spirocheta pallida from ulcerated specific lesions, is described as follows.

"First carefully clean the lesion, using water or salt solution, and then wash it with 95 per cent. alcohol. This is only slightly painful. Then by lateral pressure we almost always secure a most abundant supply of serum, presumably serum from the deeper layers; for since we have been applying alcohol to the primary lesions or the ulcerated secondary lesions our percentage of recoveries of the spirocheta pallida has averaged at least 95 per cent. It is impossible to say what the percentage of recoveries was before the use of alcohol, but we estimate it at least 20 or 25 per cent. less."



TEST FOR ALBUMIN IN URINE.—Vaughn (*Jour. Lab. and Clin. Med.*, October, 1915). Heat and nitric acid, simply and combined, with the contact test, remain the reliable means for the recognition of albumin in the urine. All other tests are objectionable in some respect, and the findings, with them, are subject to misinterpretation. The tests for albumin should be made, when possible, with fresh urine. It is customary with some insurance companies to have the urine sent to a central laboratory. Boric acid is added to the urine as a preservative, and is probably as good as any, but many of the samples when examined, contain more or less of bacterial growth. It is the rule to heat such urine with strong alkali, filter and test the filtrate with heat and nitric acid. The alkali dissolves the bacterial proteins and the filtrate gives an albumin test even when there is none in the urine when passed. This accounts for the high percentage of albuminuria reported from some of these central laboratories.

The method is to be condemned. It seems difficult for some medical men to get away from the idea that bacteria are vegetable organisms. They consist mostly of protein, soluble in strong alkali, especially on the application of heat. The test, applied in the way mentioned above, gives no reliable information and is misleading. It has been suggested that the urine containing bacteria be passed through a Berkefeld filter and the heat and nitric acid test applied to the filtrate. This is open to two sources of error. In the first place, albumin when present may be held in the filter and thus escape detection. In the second place, some of the bacterial proteins may be in solution without the addition of alkali and may pass through the filter.

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ESTIMATION OF THE CARDIAC FUNCTION.—Schuetz (*Deutsch. med. Wochenschr.*, 1915, No. 47). In the examination of soldiers in various stages of exhaustion, the writer observed that the functional capacity of the heart could be estimated by determining the systolic blood-pressure in various postures. The blood-pressure is first determined as the patient lies quietly on the table, then while sitting up, then again lying down, then standing upright, and finally while lying down. If the cardiac function is reasonably good, the pressure in the seated and standing posture will be at least as high as that found when recumbent. If the pressure is lower seated than recumbent and still lower standing, the functional capacity of the heart muscle is seriously impaired.

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TREATMENT OF CARDIAC SYNCOPE.—Gunn and Martin (*Jour. of Pharmac. and Exper. Therap.*, Vol. 7, Nos. 1 and 2). On the basis of animal experiments, chiefly with chloroformed rabbits, the writers conclude that cardiac asystole can be effectively combated by means of injections of atropine, pilocarpine or adrenalin, directly into the pericardial sac. The drugs act not only after absorption into the circulation but also locally. Cases of asystole, even when the heart has ceased to beat for ten minutes, should be treated as follows. Artificial respiration is at once begun by means of a catheter inserted into the trachea; thereupon adrenalin is injected into the pericardial sac, and then the heart is massaged through a laparotomy opening. The heart should be slowly squeezed and rapidly released about forty times per minute. Finally an intravenous injection of adrenalin or pituitrin may be given.

## BOOK REVIEWS.

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THE CLINICS OF JOHN B. MURPHY, M. D., at Mercy Hospital, Chicago. Volume IV, Number VI (December, 1915). Octavo of 238 pages with 72 Illustrations. Published Bi-Monthly. Philadelphia: W. B. Saunders Company. 1915. Price per year: Paper, \$8.00; Cloth, \$12.00.

A careful reading of the first three clinics furnishes a return in the way of knowledge acquired that more than compensates for the cost of the volume. In these clinics, Murphy presents very clearly the important subjects of leukoplakia and leukoplakic papilloma in much the same forcible fashion with which he has lately dealt with the subject of Paget's disease of the nipple.

In addition to the clinics on leukoplakia, there are twenty odd other subjects covered under the following heads: Congenital Nasal Deformity, Carcinoma of the Maxillary Antrum, Thyroglossal Duct Sinus, Bilateral Cervical Ribs, Osteosarcoma of the Humerus and Scapula, Cicatricial Fixation of the Ulnar Nerve, Hyperflexion Fracture of Radius and Ulna, Extensor Contraction of the Hands, Osteitis Fibrosa Cystica of Phalanx, Multiple Angiomata, Biliary Calculus in Ampulla of Vater, Adenocarcinoma of the Cervix, Undescended Testicle, Congenital Luxation of Hip, Coxa Vara, Fracture of the Femur (comminuted T-shaped), Internal Derangement of the Knee, Sarcoma of the Popliteal Space.

Only one who has followed the Murphy "Clinics" from the start can appreciate to the full what practically amounts to their rehabilitation. This last number (December, 1915) is attractive from every point of view; the substance is more than satisfying, the editing is praiseworthy, and the illustrations represent Tom Jones at his best.

As to the editing of these "Clinics," it is again by Dr. P. G. Skillern, Jr., of Philadelphia, and again shows his painstaking care in presenting each contribution in a flawless state. The matter of careful editing is constantly overlooked by the medical reading public, or is not thought of with that degree of consideration which it deserves. In the case of Murphy's "Clinics," as they were given to the public in the beginning, the one defect was a lack of careful editing. This has now been done away with, and Dr. Murphy should be congratulated by all that his judgment has led him to select Dr. Skillern. On every page are evidences of Dr. Skillern's skill, and on every page the reader becomes at once cognizant how important it is to have an article properly 'dressed' by one who knows.

DIAGNOSTICS OF THE FUNDUS OCULI. By Edward L. Oatman, M. D., Surgeon Manhattan Eye, Ear and Throat Hospital and Brooklyn Eye and Ear Hospital, New York, Consulting Ophthalmic Surgeon Nyack Hospital and St. Mary's Hospital, Waterbury, Conn. Comprising One Volume of Text, with Two Hundred and Thirty-four Illustrations and Four Colored Plates and Two Portfolios Containing Seventy-nine Stereograms and Eight Diagnostic Cards. Troy, New York: The Southworth Company. 1913.

If there is any ophthalmologist in this country who is still without Oatman's "Diagnostics of the Fundus of the Eye," he should at once buy the work, for in the three volumes he will find something that is lacking in all his other books—something that he has waited for these many years in the matter of illustrations. Volume I concerns itself with brief descriptions of the various diseases of the fundus; but in this case brevity does not mean skimping over diseases which should have a more detailed account, but a manner of description that brings before the reader's eye, especially if he turns at once to Volumes II and III containing the stereograms, the diseases as they are seen by means of the ophthalmoscope. And it is Volume II and III that hold our attention longest, for in both are such exact and faithful reproductions of the disturbances of the fundus that only praise can be meted out. Not only is this work of benefit to the ophthalmologist, but the neurologist and the general practitioner must profit by a close perusal of the first volume and a close study of the excellent stereograms.

It has often occurred to the reviewer how sadly handicapped teachers of ophthalmology are when they attempt to impart their knowledge to students, and it has just as often occurred to the reviewer how difficult it is for students



to grasp the importance of a study of the fundus in connection with systemic disturbances. Even though the student may remember from day to day what he has been taught, that is the importance of an ophthalmoscopic examination in certain diseases, he often fails to visualize the condition, and this through no fault of his own but because stereograms, assisted by a stereoscope so as to bring out all the details of the pictures in a natural way, are not within his reach. This long-felt want has now been filled; and especially to teachers and those students who have floundered through their ophthalmological studies would we commend Oatman's excellent work.

**LABORATORY METHODS.** With Special Reference to the Needs of the General Practitioner. By B. G. R. Williams, M. D., Member of Illinois State Medical Society, etc. and E. G. C. Williams, M. D., Formerly Pathologist of Northern Michigan Hospital for the Insane, Traverse City, Mich., with an Introduction by Victor C. Vaughan, M. D., LL. D., Professor of Hygiene and Physiological Chemistry and Dean of the Department of Medicine and Surgery, University of Michigan, Ann Arbor, Michigan. Third Edition. Illustrated with Forty-Three Engravings. St. Louis: C. V. Mosby Company. 1915. Price, \$2.50.

The necessity for the publication of a book such as this one in addition to the numerous larger standard publications is of course questionable; but the facts that we have before us the third edition as well as the very strong and definite recommendation given the book by Professor V. C. Vaughan bear evidence that there is a medical public to whom the book is of value and that certain persons find the work meritorious.

And there is little question that the book has the very definite merit of simplifying laboratory work, and offering suggestions for laboratory apparatus which might be of value where cost and possibilities of getting apparatus were a consideration.

It is certain that the practitioner who carries out all the laboratory tests outlined in this book would be serving his clients well; the various methods are as a rule well outlined and set forth in such a manner that their carrying out should be easy. The field of laboratory diagnosis is well covered, and as far as the contents of the book is concerned it is as complete as one could desire.

It is especially worthy of note that the value of the 'expert' laboratory diagnostician is well explained, and that the authors have seen fit to criticize laboratory men who report to the physician "only a curt positive or negative."

It is not certain that the best tests have always been recommended, nor that when a certain test is recommended the value of other tests is given due recognition. This may be the result of brevity, but appears from the text to be rather the result of dogmatism.

We cannot but differ with the preference given to the Diazo reaction over the Widal reaction in the diagnosis of typhoid fever; the statement that "no practical cultural methods are known" for the *spirocheta pallida*, while strictly correct, gives the impression that the *spirocheta pallida* has never been cultivated. One omission which should not have been allowed is that there is no discussion of pyorrhea and the *ameba buccalis*.

Finally the book has an index which is serviceable and complete. Unfortunately the same cannot be said for the illustrations; they are as a rule poor and often deceptive; the only illustrations which are of any value are those from photographs of laboratory apparatus.

The table of contents was in all probability written by a newspaper man with a sense of humor. Certainly such chapter headings as "Vascular Dramas," "Searching for Germs," or "To Find the Treponema in Six Minutes" bear the ear-marks of our dailies.

**THE ETIOLOGY OF TYPHUS EXANTHEMATICUS.** By Harry Plotz, Peter K. Olitsky and George Baehr. Reprinted from *The Journal of Infectious Diseases*, Vol. 17, No. 1, July, 1915, pp. 1-68. Chicago: Journal of Infectious Diseases Publishing Co. 1915.

This monograph deals with investigations upon the organism which the authors believe to be the cause of typhus fever. It is described as a small, pleomorphic, gram-positive bacillus, not motile, not encapsulated, not acid fast. In culture it is an obligatory anaerobe. It has been recovered from the blood of patients suffering with typhus, has been grown in pure culture, and has produced typical typhus fever upon injection into animals. Complement deviation has been demonstrated with an extract of the bacillus as antigen, and the tests are specific. The monograph should be read by those who wish to follow this significant piece of work.



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## EDITORIAL.

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### AND THE GREATEST OF THESE IS—MALE BABIES.

When the Great War started, or rather shortly after, there was much speculation among eugenists, sociologists, and the innumerable deep thinkers whose lucubrations appear in the newspapers with a regularity that indicates inspiration, as to what the warring countries would do after the war, since it was clearly to be seen, except by the purblind, that after the slaughter of thousands upon thousands of men the male contingent, so necessary to the preservation of the race, would not be forthcoming to do its duty as procreators. The lamentations that went up were quite heartrending; and when the lamenters heard that compulsory marriages were being instituted in certain countries so that the birth-rate would not fall off too decidedly, there was a fresh outburst of grief commingled with indignation lest the science of eugenics should be swamped forever. No doubt when the welkin rang with all these cries of distress, that wise old mistress of the world, Nature, hid her face for fear someone might see her smile and construe from her unsympathetic attitude that she was too ignorant and too non-receptive to benefit by the teachings of man. That her smiles were the outcome of a deeper knowledge than is possessed by mankind has lately been shown by a correspondent in the *Spectator* (London), quoted in the *Medical Press and Circular* of December 8th, 1915, who shows that from August to September, 1914, the two sexes balanced one another, whereas in the months from May to September, 1915, the percentages of increase of males over females were respectively as follows: May, 12.8; June, 30; July, 21.3; August, 9.4; September, 20.

Even though the foregoing statistics are open to criticism on account of some discrepancy, the fact remains they hold enough truth to disqualify the twaddle we have heard and read about the degeneracy of the warring countries, in case the Great Misunderstanding continues much longer,—a degeneracy that must come if only to prove the theory that in his grapplings with the secrets which Nature keeps securely locked in her breast, man is supreme in showing her how greatly her vaunted wisdom is at fault! War is terrible enough without theories; it is an actuality that breeds among all people, even among those who are not at war, emotions that are abnormal; it destroys, miles away from the battlefield, the equilibrium that declares for at least a partial normality; it launches hatred and makes of it a symbol to be worshipped by mankind. Things are bad enough with the nations who are embroiled without burdening them with the possibilities which might or might not obtain in the future, and the one possibility that should be decried by all medical men is the matter of a threatened degeneracy for any one nation. A low birth-rate is not always to be deplored; and while it is sheer balderdash to say that this war will teach people so many wise lessons that the next generation will be composed only of physical and intellectual giants, it is just as asinine to state that beyond a doubt the killing off of thousands of men, who might have been future procreators, will result in a reversal of the present intellectual and physical status of the warring nations into a condition that will spell only unfitness.

The statistics which we have mentioned should be of great interest to all those medical men who have been, and are still, interested in the determination of sex. Of late their writings on this fascinating subject have not been any too novel; but, with the knowledge that these statistics will give them, a chapter of rare interest will be added to the many other chapters, and we have no doubt the matter will be treated from many points of view. While we hesitate to give gratuitous advice to men who have made a special study of the determination of sex, with results gratifying to themselves but not to others, yet in our enthusiasm as to why male babies should predominate at least in one of the belligerent countries, the spirit moves us to give forth this bit of knowledge whether wanted or not—namely, the constant excitement resulting from excessive patriotism; the dynamic evolution through which everyone passes when he changes from a peaceful citizen into a soldier; the one great desire to send better and better trained men to the front to worst the enemy; in short, the obsessing idea of victory to be achieved only

by a large and powerful army may have overcome the sly and secretive ways of the right and left ovaries, those hitherto stubborn determiners of sex,—may have vanquished them so completely that in the future we shall never hear of them again, nor of the influence of tidal waves or meat diet or any one of the other numerous theories which die shortly after they see the light of day. P. S.

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### SOME THOUGHTS ON POST-GRADUATE INSTRUCTION.

It is not an idle rumor but a fact that when even a great singer or a great pianist wishes to learn a new rôle in an opera, as is the case with the former, or wishes to learn a new and difficult composition for presentation in public, as is the case with the latter, a singer practises the part with his or her former teacher, studies assiduously in the quiet of a secluded room, devotes hours upon hours to the acquirement of the proper tone and mastery of technique, and a pianist by digital exercises prosecuted with a perseverance that is almost dynamic does not rest until there is a response from the instrument in consonance with the demands put forth by his intelligence and great talent. But with less talented persons pursuing similar professional careers the effort, that must be made to reach even a goal that has few perfections, is strenuous and of an earnestness that bespeaks the seriousness of the undertaking and the difficulties which lie in the way to partial achievement. In medicine, on the other hand, we rarely hear of physicians, who have been in practice for a number of years, returning to the schools of which they are graduates, or taking a special course in one of the post-graduate schools, so as to perfect themselves in the new and advanced phases of medicine or surgery, which at the moment are not only enlisting their attention but which they hope to prosecute with success. The thought with them must be that being full-fledged physicians with a large and increasing practice, and with the confidence of their patients always at hand to bolster up their *amour propre*, it would be a bit demeaning for them to retire from their activities for a short space of time and learn the latest chapters in medicine offered by a post-graduate course in a school situated in a large city where clinical instruction and some research work and a great deal of technique could be acquired. And yet how important this is not only for the physician in our smaller communities, but also for him who lives and thrives in great centers but is obdurate to serving again what he deems an apprenticeship that is meant only for tyros!



What the singer and pianist are continually doing, the physician ought to do; and even though a few of his patients and, for that matter, a few of his confrères may say somewhat sneeringly that to begin to learn in a school again is really a confession of his shortcomings, he should not weaken in his resolve to learn or improve no matter how often this petty criticism is repeated. The same critics have nothing but praise to offer when he goes abroad to learn the 'latest medical news,' but, of course, that is another pair of sleeves, as the French say, and has all the glamour and the false values which the lay and medical mind utilizes when it disdainfully expresses its disapproval of a physician, by saying with intense rising inflection and a deal of over-emphasis: "And so you have never been abroad?"

In the present issue of the JOURNAL, Dr. Frank Spooner Churchill, of Chicago, has considerable to say on the subject of post-graduate instruction in this country, and brings out its salient features with felicity and a complete understanding of the matter. He knows as well as others who have cogitated over the neglect of post-graduate teachings, inclusive of bedside instruction and research work, by physicians who rush to Europe on the slightest provocation,—sometimes because they have read about a new instrument which in their eagerness to acquire at once is the only motive that impels them to go,—how seldom medical schools of a high standard are resorted to for wider and deeper knowledge and the profit which would be theirs were they to content themselves with home instruction. And the gist of his paper is an earnest plea for what our post-graduate instruction offers to him who is not caught in the meshes of the necessity of a foreign medical education covering some six months, one-third of which time is spent in sightseeing, one-third in learning a foreign language, and one-third in attempting to learn 'the last cry' in clinical instruction or operative procedures!

If our under-graduates would avail themselves during their vacation of a tour through the hospitals of Europe, considerable would be learned by them despite the handicap of not knowing the language and not knowing any too much of medicine: a broader view would be theirs, an undoubted acquisition of points of view which do not obtain with us, an illumination where perhaps formerly there was only a mere glimmering of light, and, finally, a greater appreciation, by contrast, of what their own school at home offers. But when full-fledged physicians, who have toiled and moiled, who have aspirations to improve and who really want to learn the latest lesson in medicine, take themselves abroad for the sake of learning

what the European medical mind has accomplished, the tour is a mere 'holidaying,' a jump from clinic to clinic, a partial and sometimes a pitifully small asset to what they already know, a bewilderment, and not the slightest unlearning of the faults which need correction. And it is for the great majority of men who have suffered in the manner we have attempted to describe that the medical schools in this country with university affiliations are putting forth their best efforts so that the medical man's profit shall be of the sort that cannot possibly be disputed and his self-respect and his sincerity kept intact.

P. S.

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### THE GIRL WHO WOULD DIE THIN.

It can be said without infracting the truth to a great degree that this is the age of investigation and constant desire for improvement. What has been done as regards investigations of a purely scientific character is a chapter of high worth and might, were we to expatiate on it here, be sneered at as are all twice-told tales. In fact, though the word 'science' rolls from our lips on every occasion when we are sure the listener is amiable and receptive and a good subject to shout our praise to others, on other occasions, when he expresses a belligerency to its reiteration, we gracefully drop, as did Silas Wegg, into poetry—that is we take up the popular medical and scientific subjects of the day and by our superficiality and earnestness as reformers retain him still as a friend and a means of advertising. Of course, the listener is flattered and delighted, because in the first place he is receiving what he supposes to be confidences which have never been imparted to others and of an educational sort that cannot fail to be a factor of interest in all his future conversations, and secondly, because his informer is especially gracious in not including him in his rather severe denunciations of the lack of knowledge of hygiene among the poor, the increasing number of immoral folk, the tendency toward degeneration, and the matter of overeating and general lack of exercise with its attendant evil—obesity. Can it be denied by anyone, who has watched during these latter years the evolution of medicine from its so-called cloistered halls and its restricted field of operation into the broad expanse dotted with many problems cast gratuitously before the people for solution through their hearty cooperation, that the one object in view with those who had the popularization of medicine at heart was the leading of the ignorant, who had walked in darkness to their own destruction of health and morals, into that broad

avenue of light and reason the treading of which would be followed by a just appreciation of the wholesomeness of food, of the advantages of fresh air and the copious use of water, and an abhorrence of patent medicines? And yet every now and then there is brought home to us the futility of their labors, and in such manner that we must doubt their near-reaching and far-reaching effects. Who is to blame? Does the fault lie with the obdurate and stubborn public steeped in ignorance and enamored of stuffy rooms and gross immorality and with so decided a weakness for patent medicines that a deprivation of the latter is like separating it ruthlessly from very dear friends, or with the medical men who fail to reach the desired goal because of too much prattle about science and the dreadful consequences resulting from the slightest inattention to the laws they lay down? A case in point showing how little has been achieved by our medical men who have gone among the people, torch in hand, to lead them to the Promised Land of happiness and content and physical and mental health has been well illustrated in a poem, recently published in the *Little Review* (Chicago), wherein the authoress, Mary Aldis, unwittingly indicts the whole medical profession for still allowing the sale of a patent medicine to reduce obesity. The strange title of the poem in homely and unadorned 'free verse' is "Ellie: The Tragic Tale of An Obese Girl."

Mrs. Aldis—thus runs the poem—had a manicurist who was "a great big lummoX of a girl—a continent" with "silly bulging cheeks and puffy forehead," and who one day said to the poetess, weeping and distraught, "I'm so fat, so awful, awful fat, The boys won't look at me." She asked Mrs. Aldis for help and Mrs. Aldis suggested, "A doctor's vague advice to bant and exercise," and "Ellie and her woes passed from my mind, Until, as summer dawned again, I heard that she was dead." Mrs. Aldis went to the funeral and saw Ellie lying in her coffin and was told by Ellie's mother, "She must a made it [the dress] by herself, It's queer it fitted perfectly, An' her all thin like that." Later in the evening Mrs. Aldis received the following confidences from Ellie's mother: "'T'was the stuff she took that did it, I never knew till after she was dead, The bottles in the woodshed, hundreds of 'em, All labelled 'Caldwell's Great Obesity Cure Warranted Safe and Rapid.'"

To sermonize here, we have Mrs. Aldis, who we know to be a highly intelligent woman and one not only interested in the uplift of the drama but also in the uplift of the common (?) people, merely saying to a girl, who is wretchedly unhappy about her elephantine size: All that I can give you is a doctor's vague advice



to bant and exercise. She might have given her Vance Thompson's epoch-making book "Eat and Grow Thin," or read chapters from it to the unhappy girl, thereby convincing her that starvation is unnecessary and also a patent medicine. But with a coldness that is most reprehensible, she gave "a doctor's vague advice to bant and exercise," and evidently Ellie would none of this. She might also have consulted the hundred and one doctors in Chicago or elsewhere who specialize in the reduction of fat, and who could have given her for "the continent" a diet chart or perhaps a pill to effect the desired change. But she did not think this necessary; she did not feel it her duty. But if we have only adverse criticism for Mrs. Aldis' uncharitable act, what direful words of commination should we not visit on the doctor who gave the "vague advice." In an age when the cult of slimness is uppermost in everybody's mind, is it possible that the doctor consulted by Mrs. Aldis was so untrue to his mission as a public benefactor that he gave only "vague advice," or is Mrs. Aldis maligning the whole medical profession and trying to show that by his "vague advice" the doctor was really responsible for Ellie's death by driving her into taking "the bottles in the woodshed, hundreds of 'em, All labelled 'Caldwell's Great Obesity Cure Warranted Safe and Rapid' "?

The lesson contained in the poetic lines of Mrs. Aldis' little tragedy is a bitter one for all those medical men who have made strenuous efforts to let the public share their deep and vast knowledge without so much as asking for the slightest compensation. It shows beyond a doubt that not only are the Ellies of this world unwilling to imbibe science in a popular form, but also the Aldises of a much higher intelligence. It shows that the lure of patent medicine is a very strong one and that a doctor's "vague advice" cannot offset it. Strange, indeed, that a doctor's "vague advice" should be so inconsequential opposite so patently fraudulent a preparation as 'Caldwell's Great Obesity Cure,' but stranger still is what we are about to record—namely, the failure of our medical propagandists to combat in an intelligent way that most simple of all our metabolic disturbances—obesity!

P. S.

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#### BOOKS AND AUTHORS.

In "Marie Tarnowska" by Anne Vivanti Chartres (The Century Company, New York) we have a good illustration how mischievous it is for a medical man to act as sponsor to a book of this sort. The heroine, a Russian countess, has recently been liberated from prison to which she was sentenced for eight years for instigat-

ing the murder of Count Paul Kamarowsky under circumstances which undoubtedly show that she was no better than any criminal of a lesser social position. And yet Professor Bossi of the University of Genoa writes an Introduction from which we are to infer that the case was an unusual one and that instead of being sent to prison the countess should have been under observation in a sanatorium. The story of Countess Marie Tarnowska's life, as told by her to Mrs. Chartres, is one of great interest and unfolds chapter after chapter of a phase of Russian life which is not any too well-known in the western world and not any too well understood. The very foreignness of the story is its greatest charm: the strange point of view, the combination of extreme childishness and extreme worldliness, the excuses and palliations for acts which the western mind always condemns. But as a message to the world to be studied in the light of a medical case that should have received either local or operative treatment before the crime was committed so as to obviate the deed, or afterwards so as to exercise a humane attitude towards the culprit, it is of no value even though so distinguished a name as that of Professor Bossi is affixed to the document. Just why a woman who has a chronic salpingitis should escape punishment for evolving a plot with the help of her lawyer that caused the death of an innocent person, is a bit of reasoning which shows how wrong it is for medicine to interfere in a case that has all the hall-marks which characterize the astute and scheming criminal.

P. S.

# ORIGINAL ARTICLES.

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## SOME ASPECTS OF HYPOTENSION.

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Since the advent of clinical methods of recording blood-pressure, attention has been centered upon those conditions associated with increased arterial tension, and subnormal pressures have received little study. Apart from those instances in which the hypotension is a symptom of a definite disease, it has not been regarded as particularly important. The main reason for this lies in the fact that the deviation from normal is much less than in the hypertensive group, so that a diagnosis of hypotension can only be made on the basis of long continued and carefully controlled observations.

There are, however, individuals in whom the blood-pressure is practically always below normal, and who exhibit symptoms which seem to be associated with this circulatory condition. While it is possible in many of these cases to find a cause for the hypotension in the shape of an accompanying anemia, infection, or condition which tends to produce general debility, there are a certain number in which no cause for the low pressure can be found. Under such conditions, the hypotension is usually disregarded, and the symptoms associated with it are ascribed to the convenient and badly overworked diagnosis of neurasthenia.

Two cases which came under the writer's observation at the Robert Bent Brigham Hospital seem to show that various symptoms usually ascribed to neurasthenia or debility may have their origin in a continued low blood-pressure. In neither case was the diagnosis established before autopsy, though in the second a tentative diagnosis was made on the basis of its similarity to the first. A report of these cases is given here in detail.

CASE 1.—Hospital number 50. Sailor, *æt.* sixty-three, widower. Entered the hospital May 9th, 1914. Family and past history not important. *Present Illness.*—Five years ago began to have attacks of general weakness occasionally accompanied by vertigo, palpitation or dyspnea. At first these attacks were infrequent, and separated by periods of good health. They have gradually become worse, and for the last three years patient has been unable to do any work on account of weakness. He has lost some weight. Appetite poor. Sleeps well, no cough, bowels constipated. No urinary difficulty.



Physical examination at the time of entrance showed a well-developed poorly-nourished man whose striking characteristic was his appearance of marked dejection. Save for a systolic murmur at the cardiac apex and a slight inequality of pupils the physical examination was negative. The urine at entrance was normal. The blood gave a positive Wassermann reaction but was otherwise normal.

The patient remained in the hospital four months. Several injections of salvarsan were given without result. His blood-pressure, taken daily over several periods of two weeks, varied between 100 and 85 systolic, and 80 and 60 diastolic. At the beginning he was up and about, but always lay down by choice. During the last month of his life he was unable to get out of bed, and even there complained of great weakness. Toward the end the urine showed a slight trace of albumin, with a few red corpuscles in the sediment. Patient grew gradually weaker and died.

Autopsy showed some chronic nephritis, and double hypernephroma. Both adrenals were large and almost enclosed the kidneys. On section the enlargement was found to be chiefly due to overgrowth of the medullary portion which was a pale yellowish gray. Microscopic examination showed hypernephroma. There were no metastases.

CASE 2.—Hospital number 69. Machinist, *æt.* sixty-four, married. Entered hospital June 25th, 1914. Family and past history unimportant. Venereal disease denied. *Present Illness.*—Two years before entrance, while walking felt a sudden pain through back and hips. This pain has been constant since, and one year ago obliged him to give up work. His general health at first was good, but for the past year has been growing steadily weaker, and for three months had been unable to walk on account of weakness. At entrance his 'presenting symptom' was weakness. There had been some loss of weight, and the pain in the hips persisted. Appetite fair, sleep poor, no cough, bowels constipated, no urinary disorder.

Physical examination showed a fairly developed, poorly nourished man. He was pallid and evidently weak. There was a moderate amount of lordosis, and the chest was barrel-shaped. Examination was otherwise negative. The urine was normal. The blood showed 4,200,000 red corpuscles per c.mm. Wassermann reaction was negative. Blood-pressure, 90 systolic, 70 diastolic. X-rays of the bones showed osteomalacia.

During his first week in the hospital, a careful record of the patient's blood-pressure was kept. The systolic pressure varied between 90 and 95; the diastolic remained constant at 65. The following week the patient was given adrenalin subcutaneously, and the pressures again carefully recorded. The systolic readings varied between 100 and 105; the diastolic remained constant at 70. As a control, the adrenalin was then omitted for a week, and the pressure fell to 90 systolic, 55 diastolic. Patient again given adrenalin. The blood-pressure rose slowly but steadily, until two weeks later it had reached 115 systolic, 70 diastolic. At this time patient felt much stronger, and his general condition was improved. Four weeks later he developed pneumonia and died.

At autopsy, both adrenals were found to be very small, and in both the medulla was almost entirely replaced by cystic cavities. The cortex was not remarkable.

These two cases are reported in detail not only because they are in themselves interesting, but also because they appear to throw some light on the question of hypotension. In both the marked symptoms were weakness and apathy, marked fatigability and a tendency toward vertigo. In both, autopsy showed adrenal disease.

In one the symptoms were markedly alleviated by the administration of adrenalin. It seems fair to assume therefore, that the symptoms were due to the hypofunction of the adrenal glands, and that the low blood-pressure was due to the same cause.

Similar to these cases in character, though showing less marked symptoms, is a group which comes under the observation of almost every practising physician. The symptoms comprise apathy, sometimes amounting to actual physical weakness, poor appetite and sleep, a tendency to headache and vertigo after moderate exertion, and occasionally palpitation. In short, the patients are unable to perform what is an easy day's work for the normal individual without experiencing symptoms of marked fatigue. The condition is usually diagnosed as neurasthenia, debility, or, in the absence of an examination of the blood, anemia.

The writer has collected 20 such cases seen by him in practice. An analysis of the group brings out the following points. All the patients were between fifteen and thirty-five years of age. There was but one under twenty. Females predominated over males, the figures being fourteen of the former and six of the latter. In every case the patient's chief complaint was inability to perform the daily routine which had once been normal. The onset in every case was gradual, but in 16 cases there was a previous history either of prolonged mental strain or illness. In the fifteen-year-old patient the symptoms began six months after the appearance of menstruation, which was slow in becoming established. In no case did an examination of the blood show a hemoglobin percentage of less than 85, and the red corpuscles were in no instance less than 4,320,000. There was therefore no more than a very moderate anemia to account for the symptoms. Sleep was described as disturbed or poor in sixteen cases. There was usually no trouble in going to sleep, but the patient would wake during the night and find it difficult to go to sleep again. This was generally followed by a marked feeling of fatigue on rising. Poor appetite was present in every case, constipation in fifteen. Five complained of vertigo, two others of headache, and three of palpitation after very moderate exertion. All the patients had low blood-pressures, determined by repeated tests. They felt better in the afternoon and shortly after meals, at which time the pressure reached its highest mark.<sup>1</sup> The highest pressure in the series was 100 systolic, 70 diastolic; the lowest 85 systolic and 60 diastolic; the average for the series was 96+ systolic and 77+ diastolic. Physical and urinary examinations were essentially negative in every case.

A comparison of the symptoms enumerated above with those described by Falta<sup>2</sup> as typical of hypofunction of the adrenal system is interesting. To quote from his description of Addison's disease: "Almost always the disease manifests itself in ready fatigability,

disinclination for work, and apathy; to these symptoms are sometimes added headaches, bad sleep, sometimes obstinate insomnia, psychical ill-humor and depression, often too, abnormal irritability; further, diminution in memory, noises in the ears, vertigo and commonly fainting attacks. . . . Dyspnea ensues on slight physical exertion. The count of erythrocytes and the hemoglobin content are almost always reduced, the leucocyte count is mostly normal."

The similarity between these symptoms of known adrenal insufficiency and those described in the writer's series is marked. The difference is one of degree merely, the latter being less severe. Twenty cases is too small a series to draw conclusive deductions from, but enough to suggest strongly that the group of symptoms noted is due to subnormal functioning of the adrenal apparatus. The improvement noted in Case 2 when adrenalin was administered is a point in favor of this theory. The therapeutic results obtained in private practice are practically of no value in this connection, as the patients objected to prolonged subcutaneous medication for what seemed to them a minor complaint. Adrenal substance administered by mouth gave no striking or definite results, as was expected. This fact proves nothing, however, since adrenalin introduced into the stomach is destroyed there.

There is, however, a certain amount to be gained by recognizing these cases apart from the satisfaction of correct diagnosis. The treatment usually employed in cases of neurasthenia and anemia is generally unsuccessful in these cases, while the recognition of the limitation of a patient's efficiency leads to the establishment of a logical therapeutic regime. The important point in the care of these cases is diminishing the day's work to meet the patient's capacity. Under these conditions improvement may be looked for, though it will be gradual. Drugs are of little value with one possible exception. The writer has had encouraging results in his more recent cases from atropine administered in small doses, carefully controlled. Whether this be due to its stimulant action or to its effect on the circulation is not yet determined. In the 5 cases in which it has been used, there has been a resultant rise in blood-pressure averaging 10 mm. systolic, and 5 diastolic. Sleep has been improved and the feeling of weakness somewhat diminished. Both the insomnia and the depression have been increased in those cases in which sedatives were administered. Hydrotherapy and massage have been useful in a few cases.

It is not the purpose of this paper to establish any definite conclusions. The material is too meagre. There are, however, certain hypotheses which the writer wishes to present for study and criticism. These are—



1. True hypofunction of the adrenals may occur in diseases of those organs apart from Addison's disease.
2. It may also occur without organic disease of those glands, usually as the result of prolonged physical or mental strain.
3. The symptoms of the latter condition differ from the former only in severity.
4. These symptoms are often ascribed to neurasthenia or anemia, with the result that the condition is not properly treated.
5. Atropine may be useful in the treatment of this condition; sedatives are usually harmful.
6. The condition demands further study.

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- <sup>2</sup> Falta: *The Ductless Glandular Diseases*, pp. 336 and 337.

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## THERAPEUTIC MEASURES FOR PULMONARY TUBERCULOSIS SUGGESTED DURING 1915.\*

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In reviewing the therapeutic measures used during the past year against tuberculosis, a recital of all the drugs and other agents recommended would be both wearisome and unprofitable. I propose to give a brief résumé of the progress made along certain therapeutic lines. Excluding from this discussion the accepted principles of the Brehmer-Dettweiler method of treatment, all measures used against tuberculosis may be grouped into four large classes: (1) Bacterio- and immuno-therapy; (2) chemotherapy; (3) ray-therapy (sunlight, radium, and artificial rays); (4) surgery.

In the first division of bacterio- and immuno-therapy belong the various tuberculins, vaccines and serums. Tuberculins and vaccines aim to call forth a resistance against tuberculosis, while the serums seek to supply the body with certain immunizing and antitoxic substances. The injection of tuberculin while raising the resistance of the body toward the poisons of tuberculosis never immunizes against tuberculosis. Tuberculin immunity never means tuberculosis immunity. This is easily seen when we inject the killed tubercle bacillus into the body. Tubercles form but no tuberculosis exists. Let, however, these bacilli possess but the faintest spark of life and the picture is immediately changed—tubercles form, and with their formation goes a changed reaction on the part of the body—a real immunity. To these two groups of bacterio- and immuno-therapy little has been added during the past year. There are the occasional writers who proclaim the value of this or that tuberculin, but nothing new has been added to the facts already known as to its use in treatment.

The theoretical considerations of Deyke and Much are interesting. They believe that the tuberculous individual produces antibodies against various parts of the tubercle bacillus, such as the fat of the capsule and different proteids of the bacillary body. Chiefly by lactic acid these authors split the bacilli into component parts. These parts they call partial antigens. By complement fixation or by intradermic tests with these antigens they find out which antibodies are lacking in the body. These failing or absent antibodies they attempt to stimulate, or call forth, by subcutaneous injections

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of the respective antigens. Always they find one or more partial antibodies lacking in the tuberculous body. Good antibody formation against all antigens shows immunity. Complete failure of all antibodies leads to miliary tuberculosis. These are very broad statements.

Alstaedt<sup>1</sup> is enthusiastic over his clinical results obtained with partial antigens, thirteen unselected cases showing very satisfactory improvement. But the technique of complement fixation in tuberculosis is full of pitfalls, and we are still indefinite as to the exact interpretation of skin reactions.

Pannwitz,<sup>2</sup> from a questionnaire addressed to various physicians throughout Germany, concludes from their answers that they consider tuberculin no remedy against tuberculosis, but that for selected cases it is a supporting agent of other therapeutic measures.

Passive immunity by the use of serum obtained from an immunized animal is still recommended by its chief exponents—Maragliano and Marmoreck. In the hands of others experimental and clinical results in this type of immuno-therapy are inconclusive.

Combinations of killed bacteria and immune serum, or of pressed and filtered tuberculous organs, juggled in every conceivable manner, have been tried therapeutically but without noteworthy success.

Theoretically in the path of real immunity belongs Friedmann's vaccine—living organisms introduced into the body to act as a focus of infection. Unfortunately the wished-for immunity reaction against human tuberculosis is lacking, and the untoward effects produced by the injection have caused the remedy to be almost universally condemned.

#### CHEMOTHERAPY.

In this field, experiments have continued with new combinations and preparations, but not a great deal of evident real value has been added. Clinical work has been carried on chiefly with the copper and gold preparations.

Finkler, von Linden, Strauss, Meissen and Selters, who have carried out original work, recommend the much praised copper compound for therapeutic use. In this list belong electrocuprol lecytol, copper-lecithin, and copper and methylene-blue combinations. No very conclusive experimental work by these exponents of copper has been done, and clinically the results are not striking. The external application of the Cu salve often acts as an irritant, and the intravenous and muscular injections are generally followed by severe chills, and local tissue irritation. As noted last year, Corper<sup>3</sup> could not confirm the early favorable reports of the action of copper in tuberculous animals. The latest conclusion, voiced by DeWitt,<sup>4</sup> is that "copper has no value in the fight against tuberculosis; that its use is unjustifiable and may even prove dangerous."



The clinical results obtained by the use of gold seem to be more real than from any of the other heavy metals. The chief products used are gold cantharadin and gold and potassium cyanide. A few cases of cyanide poisoning, and one or two deaths have been reported following the use of the gold. The most extensive clinical work has been done by Spiess and Feldt<sup>5</sup> in tuberculous laryngitis. They see a quicker healing of the ulcers and an arrest of the pulmonary trouble. Schroeder,<sup>6</sup> in whom we may place much confidence, has used the gold cyanide on several advanced cases with tuberculous laryngitis. He notices a very evident improvement in the throat condition as regards the tendency toward the healing of ulcers, and a reduction in the swelling. The general condition, the lung process, and the fever were influenced less noticeably. He is making a more extensive trial with gold, and will report in detail later.

Recently Mehler and Ascher<sup>7</sup> have given us their theories of action and results with a preparation called borcholin. This is a combination of borax and cholin. Cholin is a product of split-up lecithin. One of the theories of the action of *x*-ray upon tissue, *i. e.*, the *x*-ray burn, is that the rays break down the lecithin into various products of which cholin is one. This cholin acts destructively. It is claimed that by the injection of cholin a burn may be produced similar to the *x*-ray burn. Gauss<sup>8</sup> has noted menstrual disturbances after cholin injections similar to those after *x*-ray treatments. Deyke and Much<sup>9</sup> have demonstrated the bacteriolytic property of cholin. Mehler and Ascher maintain that the cholin attacks the capsule of the bacillus. On this ground Mayer<sup>10</sup> uses enzytol (10 per cent. borcholin) to destroy the capsule and gold-potassium, cyanide to kill the bacillus. He believes this combination specific. Mehler and Ascher say enzytol is sufficient. They give detailed reports of 25 open cases in different stages. Of these, one died one year after treatment from a hemorrhage. All the rest are living and many working two years after treatment. The authors believe that this is a better showing than 25 like cases sent out after sanatorium treatment. It is interesting to note that nearly all authors recommend that with their chemotherapeutic agents, tuberculin, or salvarsan, or natural or artificial raying be given at the same time!

With the various dyes nothing of therapeutic value has been advanced during the year. Wells<sup>11</sup> finds that the various arsenic preparations—such as salvarsan, cacodylate of sodium, atoxyl, arsazetin, and neo-salvarsan are, *in vitro*, without destructive action on the tubercle bacillus.

#### RAY-THERAPY.

One field of therapy which is being more and more extensively explored is the action of various rays upon the body. This includes

not only the sun's rays, but the rays from radium, and those artificially produced by various lamps, and the roentgen apparatus.

We are all more or less familiar with the work of Rollier at Leysin, in the Swiss Alps, whose efforts have brought the subject of heliotherapy prominently before the profession. He deals almost entirely with the so-called surgical tuberculosis, but the action of the sun's rays upon pulmonary tuberculosis has been tried by others.

Light coming from the sun can be split up into various colored rays by a prism. This is called the visible spectrum. On either side of this spectrum are invisible rays—the infra-red on one end and the ultra-violet on the other. It is these latter rays that we are particularly interested in. They are also called actinic rays. Light rays have three properties—heat production, light production, and chemical action. The red rays are chiefly heat rays, the yellow—light, and the violet and ultra-violet are chemical in their action. All rays either visible or invisible differ in their absorbability, and therefore in their action, for only those rays have an effect which are absorbed. The action of light on the human body varies according to the intensity, the altitude and the individual. Light coming from the sun loses energy as it passes through the air. The chemical rays show the greatest loss. This loss depends upon the position of the sun, and upon the amount of foreign matter and moisture in the air. The light intensity of the high altitudes is much greater than the low. The volume of the ultra-violet rays increases with altitude. The intensity of the ultra-violet rays is fairly constant in high altitudes from summer to winter, while in the lowlands there is a great seasonal variation.

Pigmentation of the exposed skin takes place chiefly by means of the ultra-violet and violet rays. Theories as to the actual formation of pigment do not concern us here. As to the pigment itself, some hold that it is an act of nature to protect against the ultra-violet rays; others that the layer of pigment transforms the chemical short wave rays into long wave rays which have a deeper penetration. Rollier states that prognosis and rapidity of healing are, as a rule, proportionate to the degree of pigmentation.

Only about 1/100 part of the light falling on the body penetrates to a depth of 5 cm., but some rays reach a depth of 5 to 6 cm. When light penetrates the skin practically all the chemical rays are absorbed by the blood. As Diedrich<sup>12</sup> points out, the amount of energy absorbed by the blood must be enormous, when we consider that exposure of the skin to light causes a local hyperemia. Possibly the energy absorbed by the blood is surrendered to the intestinal organs. This may explain the good effects of heliotherapy.

The finer details of technique I will not go into, but will give only a few of the principles. 1. Localized tuberculosis calls for general treatment—sunning the whole body is of first importance, sunning

the local condition is secondary. 2. Acclimatization first, then five-minute baths three times a day, increasing five minutes a day, beginning with the feet, then the legs, then the thighs, etc., until the whole body is exposed to the sunlight from four to seven hours a day. 3. Individualization is extremely important. The temperature, pulse and respiration must be closely watched. 4. Plaster casts and appliances covering large areas of skin are done away with. 5. Time and patience are necessary to obtain good results. Rollier's results in 1,129 cases are: Cured, 945; improved, 112; stationary, 119; died, 31.

Approximately the same number of cases of surgical tuberculosis were treated by heliotherapy at Alton, under the cloud strewn English skies. The results were practically the same as Rollier obtained. Gauvin and DeVoss,<sup>13</sup> of the Alton Sanatorium, deny most strenuously that the secret of success is heliotherapy, but that the good results obtained at Leysin and at Alton are due to rigorous conservative methods, and that heliotherapy is a most valuable adjuvant to treatment.

Webb<sup>14</sup> has used heliotherapy for three years in Colorado Springs, and finds it of much benefit, but is "not yet able to show the same high degree of optimism for the method which is held by Rollier." The increase of red cells and of lymphocytes reported by some as due to heliotherapy, Webb is unable to confirm.

Pryor<sup>15</sup> is enthusiastic over the results obtained by heliotherapy at Perrysburg, N. Y. Here in spite of considerable cloudy weather good pigmentation is produced. Colds are of rare occurrence.

The conclusions of the Swiss Surgical Congress<sup>16</sup> were that heliotherapy in surgical tuberculosis was a great step forward, but that surgery often hastened cure and should not be neglected.

Rollier evidently has had but little experience with heliotherapy in strictly pulmonary tuberculosis. He quotes others, however, as saying that children, or adults, in the first and second stages, non-progressive, and without fever do well. Advanced cases without fever may be helped but not healed. He believes that the results obtained are due to a general tonic action on the whole organism. In combined joint and lung tuberculosis he has noted improvement in the lung condition. By the gradual process of exposing the body he has seen no ill effects, such as hemoptysis. Extensive use of the sun's rays on lung tuberculosis at high altitudes has not been tried out, or at least I am ignorant of any such reports. We have, however, a brief report<sup>17</sup> on 364 patients with lung tuberculosis treated by sun baths, at Saugman's Sanatorium in Denmark. This institution is located by the sea, and is in a climate characterized by cold and cloudy winter and the possibility of a cold and rainy summer. Sun treatments were employed only between the months of May and October. Starting in from five to ten minutes the baths were



increased up to one hour. The 364 patients represented all stages of the disease, but no rapidly progressing cases were given heliotherapy. Slight erythema and fatigue were observed, but only in two cases was this so troublesome that the treatment had to be stopped. Rises in temperature of less than a degree were noted at first during the sun bath, but these quickly returned to normal. No other untoward effects were observed. Considering the fact that the baths were given but for one hour a day, and through the summer months only, they draw the conclusions that there is no direct influence of sunlight upon the lung process, or any marked change in symptoms. But on account of the occasional improvement seen—more rapid than otherwise expected, and because the patients enjoy the baths, they are continuing the sun treatment. They are building a place where artificial sunlight baths may be given, and so be independent of wind and weather.

Can heliotherapy be carried out with advantage elsewhere than in the Alps? There they have lessened atmospheric pressure; very infrequent winds; extreme dryness of the air; few fogs; few rainy days; long periods of sunshine; great purity of the air; great intensity of the sunlight, augmented in winter by reflection from the ice and snow. At times in winter it is 90°-120° F. in the sunshine and zero in the shade. Pigmentation of the skin takes place at any season.

The lowlands and the seashore have almost the opposite climatic qualities, while the Rocky Mountains and plateaus more nearly approach the Swiss climate. In general the rest of this country occupies a middle ground and cannot claim long periods of sunshine, nor freedom from frequent rains, nor slight daily or seasonal temperature variations—factors which may have much to do with the successful treatment by the Brehmer-Dettweiler method, but not comfortable climatic elements in which to expose the naked body. I believe, though, that as much success can be obtained elsewhere as at Perrysburg, or Sea Breeze, if heliotherapy be used as an aid to other conservative measures. Pottenger<sup>18</sup> has had considerable experience in heliotherapy, and states that those who attempt its application in pulmonary tuberculosis will be disappointed if they expect to see certain immediate results.

#### X-RAY THERAPY.

The *x*-rays have been used for a long time therapeutically in external tuberculosis. Not until recently have any extensive efforts been made to reach pulmonary lesions by penetration of the rays. Kupferle, Bacmeister and de la Camp are the chief workers in the experimental field. In this country Kessel and Sittenfield<sup>19</sup> are carrying out a series of experiments on tuberculous guinea-pigs.

All these workers agree as to the results obtained in laboratory animals.

The main conclusions which Kupferle<sup>20</sup> arrives at are:—

1. Destruction of the proliferating tuberculous tissue and the development of a ring of connective-tissue in its place.

2. Established tuberculosis is hindered in its spreading, or overcome. New tubercles, indeed, arise, but they soon become fibrous and tend to heal.

3. A direct influence upon the tubercle bacillus has not been found.

4. Clinically in 44 cases improvement has taken place under the *x*-rays, and Kupferle believes that they hasten the healing of pulmonary tuberculosis.

Frankel<sup>21</sup> is enthusiastic over his results in 80 cases, in which 64 were markedly improved. He notices in his roentgenogram a reduction in the size of the hilus glands, with a clearer outline, which he believes shows encapsulation with fibrous tissue, and a clearing up of the lung shadows. In 57 of the cases the tubercle bacilli disappeared from the sputum.

De la Camp and Kupferle<sup>22</sup> in 65 cases saw a definite 'healing' action in nearly all first and second stages, while third stage cases were benefited.

Gibson,<sup>23</sup> of Denver, reports startling results from the use of *x*-rays. He believes that by its proper application, in ten years tuberculosis could be practically banished from the world!

Results in laboratory animals cannot always be applied to man, but the similarity of findings between different laboratory workers, and the reported favorable results from *x*-ray in man leads one to believe that the rays may be an agent for much good in pulmonary tuberculosis.

#### RADIUM.

Extensive work with radium on pulmonary tuberculosis has not, to my knowledge, been undertaken. Experimental work on cultures shows that the rays can diminish the virulence of the bacillus. This is a department of ray-therapy which offers many opportunities for study. It is interesting to note that after radiation of cancer there is an infiltration of polymorphonuclear leucocytes and giant cells. This inflammatory necrotic tissue is later replaced by connective-tissue.<sup>24</sup> Such a tissue change, if it could be brought about by radium in tuberculosis, would be very desirable.

#### SURGERY.

Those interested in artificial pneumothorax should read Sachs'<sup>25</sup> valuable paper. He gives a statistical review of 1,145 cases. Out of 1,108 cases there were failures, unimprovements and deaths in 49.1 per cent. Immediately beneficial results in 29.2 per cent. and

apparently durable results in 31.7 per cent. Judged by a matter of years he places the percentage of cures at 12 per cent. Altogether Sachs shows that artificial pneumothorax offers a distinct increase of the chances of the advanced case which does not respond to usual treatment.

Of 76 cases allowed to reexpand from a few months to seven years, 53 remained in excellent or 'arrested' condition.

As to the present status of artificial pneumothorax, Sachs well states that the "tendency, grown out of experience, is toward greater conservatism in the selection of cases," and that "pneumothorax therapy is gradually finding its definite place in the treatment of cases of pulmonary tuberculosis which do not yield to other methods."

I have purposely omitted from this paper mention of drugs given for symptomatic relief. Little of noteworthy value has been added to our armamentarium during the past year.

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## POST-GRADUATE INSTRUCTION IN MEDICINE, WITH SPECIAL REFERENCE TO PEDIATRICS.

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"One of the most important problems in medical education to-day is the improvement of the physicians in active practice." It is important not only to the individual physician himself, but also from the community point of view, as has recently been emphasized by Arnold (*Jour. Amer. Med. Assoc.*, 1914, LXIV, No. 4, p. 329). To the practising physicians of the country are entrusted the safeguarding of the individual and public health, and also the actual lives of the people in their respective communities. It becomes important, therefore, from the public point of view, that physicians should be originally well-trained, and subsequently continue well informed, in medical science. The public has the right to demand, first, that recent graduates shall be sent forth into the world well educated, thoroughly acquainted with the best medical thought of the day, well equipped to assume their responsibilities as practising physicians, and, second, that these physicians shall continue to keep themselves well informed as to the rapidly advancing changes in medical science. To meet these conditions it is necessary to maintain either at private or public expense medical schools of high standing, with abundant hospital facilities, in which the first group of physicians as under-graduates can be adequately trained, to which also the second group, as graduates, may resort from time to time, there to refresh themselves, re-acquaint themselves with the new facts and theories being constantly evolved at the bedside, in the laboratory and at the post-mortem table. It is with the problem presented by this second group that this paper deals.

This second group is made up of physicians who desire to keep themselves well informed in the progress of medical science, and may be further subdivided into three classes: (1) Physicians who in their under-graduate days received inadequate training, and who, after several years of active practice, realizing their weak points, wish to improve themselves, to 'brush up' for the general practice of medicine; (2) physicians who wish to give up general practice and fit themselves to become 'specialists'; (3) physicians who wish to become 'research' workers.

The first class is by far the greatest in numbers, and the medical

schools and teaching hospitals of the country are now giving much attention to the needs of this large group of practising physicians. The necessity of meeting the needs and demands not only of this class, but also of the 'specialists' and 'research' workers, is especially urgent at present, since the clinics and hospitals of unhappy Europe are not available for purposes of study. This movement to supply post-graduate instruction in medicine is being well led and stimulated by the Council on Medical Education of the American Medical Association, the recent report of which furnishes most interesting and fruitful reading.

How shall the needs of these large numbers of physicians be met? How shall we help them to gratify their earnest wish to make themselves better professional men and women, better servants to their respective communities?

Briefly, these needs and desires may be met by furnishing to these physicians proper facilities and opportunities for study and self-education. Such study should be along the lines now universally followed in the broad field of general education, known as 'nature study.' This tendency towards 'nature study' is seen in all branches of education, and at all ages, from the kindergarten to and through the professional school. In the kindergarten and earliest grades the child is taken into the fields and public gardens to study plant life, to the zoological gardens and aquaria to study animal life; later, in the upper grades of school and in college, he is taken far afield to study geology and physical geography; in his professional education the medical student is taken to the bedside and given the actual 'specimen' or 'patient' to study. This general principle and method should be followed in the continued self-education of the practising physician in his post-graduate work: In his quest for medical knowledge and for training in new methods of the study of disease, he should be taken to the bedside for the physical examination of the patient and for the observation of symptoms, to the laboratory for perfecting his technique in new and improved methods of laboratory diagnosis, and finally, to the post-mortem table, there to study and observe the pathological conditions at the bottom of the symptoms he has been noting during life.

For the successful prosecution of such a system of education, certain conditions must be fulfilled: The clinical material to be studied must be abundant; it must be well classified, well organized. The teachers who are to present this material and to direct the student in his work must themselves have studied it carefully and thoroughly in preparation for demonstration,—in such study calling to their aid the pathologist, the chemist, the roentgenologist, carefully correlating the reports of these and other laboratory workers. 'Team play' is a *sine qua non* in the present-day method of the study and teaching of clinical medicine.

It is obvious that such conditions, abundant and well-organized clinical material, thoroughly and exhaustively investigated at the bedside and in the laboratory, under the general direction of a studious clinical chief, can be fulfilled only in a well-organized, well-equipped hospital, located preferably in a large medical center. The affiliations of such a hospital are, furthermore, important; for so complex has medical science now become, so dependent upon and so closely related to other branches of science, for example, chemistry, biology, etc., that it is best taught in connection with these other sciences, *i. e.*, in a university. A 'teaching' hospital, therefore, should be connected with the medical department of a university, whether that teaching be for under-graduates or post-graduates in medicine. In such an atmosphere will be found the highest ideals, the most comprehensive views, the best teaching.

The physical organization of the hospital is likewise important. It must have an efficient and sympathetic executive officer as superintendent, a loyal and harmoniously working attending staff, a sufficiently large resident staff, well-equipped laboratories, a training school for nurses and, if it wish to obtain *permanent* results, a closely coördinated Social Service Department.

Only in such a hospital can medical instruction, whether to under-graduates or to graduates, be given adequately; for only in such a hospital can there be gathered patients numerous enough to furnish opportunities for the study of various and manifold diseases; only in such a hospital can be carried out and applied the varied and complex methods of examination now necessary for the thorough investigation of sick people.

While the teaching of clinical medicine both to under-graduates and to graduates, is thus carried out best in such a hospital as has been described, the two groups should not be taught together but in separate classes. The needs and aims of the two sets of students are so different, that better results are attained by teaching them separately. The under-graduate's aim and object are more general; he is getting his general medical education; whereas the graduate's aim is, as a rule, more specific, dealing with a more limited field, striving perhaps to correct a specific weakness of which he has become conscious only in the actual practice of medicine. Each group will make more satisfactory progress towards its ultimate goal, working by itself.

#### POST-GRADUATES IN PEDIATRICS.

The general conditions for the medical instruction of practising physicians outlined above apply, of course, to all branches of clinical medicine. In no branch do they apply with more force than in pediatrics. In no other direction has there been more advance or



greater changes during recent years. And the advance has just begun. 'Child study' is still in its earliest stages.

The twentieth century is essentially the 'century of the child.' Intensive study of the child is being prosecuted in all directions. Not only is his physical condition in disease being carefully investigated in well-equipped hospitals, but we are paying more and more attention to the promotion of normal development and to the prevention of disease. The growth of the infant welfare movement, the rapid spread of the playground and small park idea, the widespread practice of the physical examination of public school children, all attest the deep interest felt in the physical condition of the child, while the enactment of child labor laws, the establishment of juvenile protective associations, of juvenile courts, of psychopathic institutes, and the intensive activity of social settlements in attempting to improve the environment of the youth of our cities, all bear eloquent witness to the importance of other aspects of child study. Truly, a great movement, wide and comprehensive in its scope, striking literally at the beginnings, at the roots of things, destined inevitably to affect favorably the whole child life of the nation, and thus lead to improvement of the race.

In this child welfare and child study movement, the practising physician, whether he be doing general work or limiting himself to special work, has the opportunity to play an important part. His advice is sought by the pregnant woman as to precautions with regard to her growing child,—'prenatal' work. Immediately after birth, he is consulted as to the baby's feeding,—'infant welfare work.' Later he is consulted as to the 'pros' and 'cons' of the kindergarten; then as to the problems of school: contagious disease, amount of work, of outdoor exercise, of sleep, the food, the management of puberty—and so on through all the vicissitudes and conditions of child life, there comes to the practising physician the opportunity to serve not only the individual child, but also children at large by using his knowledge and influence for the good of the community in such matters as child labor, play-grounds, small parks, juvenile courts, etc. etc.

In order that the physician may use wisely his influence in these manifold aspects of child life, it is obviously essential that he should inform himself as thoroughly as possible along these lines, and this he can best do by resort to a medical center, there to devote himself as intensively as possible to the particular problem or problems in which he is especially interested. Whether these problems have to do with the physical side of the child's life, for example, the study of infant feeding and of the pathology of early life, or with the sociological and community side, the physician will find in a children's hospital the information which he is seeking. Within the hospital walls he will find the opportunity to study, at the bedside

and in the laboratory, the clinical medicine and pathology of infancy and childhood. At the hospital as a center he will be able, if so inclined, to get in touch with, and study the various sociological activities concerned with children; for so correlated and inter-related have all these activities now become that a children's hospital in a large city finds itself in intimate relation with these 'extramural' agencies in at least two ways: Through individual members of the attending staff who, in one capacity or another, are invariably connected with other child organizations, and secondly, through its 'Social Service Department,' one of the chief objects of which is coöperation with these 'extramural' agencies. Thus a children's hospital can act as a 'clearing-house' of child study, can serve the cause of children in many ways, can aid and assist in their investigations, physicians with a great diversity of interests, whether those interests are concerned with the strictly medical side of the child, or with the mental, moral, sociological and community side of his life. The hospital in acting as such a center greatly broadens its sphere of usefulness. Not only does it attend within its walls to the sick children of its own community, but it also serves as a place of study both for the attending staff, and for other physicians seeking to increase their knowledge of the various problems incidental to children. The extent to which a hospital can thus serve the public is limited only by the amount of 'material' available for study, both intra- and extramural, and the perfection of its organization: Abundance of 'material' furnishing opportunity for the study of the many diverse and complex conditions of child life, perfection of organization making simple the utilization of that opportunity.

I have dealt thus far with the theories and principles which should govern post-graduate instruction for practising physicians. The practical working out of these theories may be illustrated by an account of The Children's Memorial Hospital in Chicago, and of the provision there made for post-graduate study in the diseases of infancy and children.

This hospital is built upon the 'pavilion plan,' with separate building for infants and children. It is exclusively charitable, there being no provision for private patients, and thus all of its material is available for teaching purposes. This material consisted during the year 1915 of 2,500 ward patients and 10,000 dispensary patients, ranging in age from prematurity to twelve years, and illustrating all the ills to which infant and child "flesh is heir." The ward patients consist of medical and surgical cases, the medical being subdivided into the baby or infant-feeding cases and older children, each service with its separate physicians, the surgical cases being subdivided into the general surgical, the orthopedic, and the various specialties: Eye, ear, nose and throat. There is also a dermato-

logical service. The daily average number of patients in the wards during 1915 was 135.

Contagious cases are not admitted as such, but, as in all children's institutions of any size, contagious disease does arise, and during the year there are seen examples of all the communicable diseases, these cases being handled in a wing specially built for the purpose. There are the usual laboratories for clinical work, a pathological department, including an autopsy room, an x-ray laboratory, and in 'Cribside,' the infant pavilion, a milk laboratory for the preparation of the individual baby's food. The autopsy room provides facilities for post-mortem work: Forty-five per cent. of the deaths during 1915 coming to autopsy.

*Organization.*—The hospital is affiliated with Rush Medical College, and all staff members both of the House and Out-Patient Department are members of the Rush Faculty. The medical affairs of the hospital, including the teaching, are under the direction of that Faculty.

The medical staff consists of nine attending physicians and surgeons, a pathologist, and of sixteen assistant attending physicians, who serve in the Out-Patient Department. The House Staff consists of two resident physicians, five internes and fifty nurses. A well-organized Social Service Department makes possible 'follow-up' work in the home, work more necessary among children even than among adults.

The members of the staff are physicians interested in the various phases of child life as presented in a large city, and are connected either as active field workers or directors, with various other organizations, among which are the Infant Welfare Society, The Juvenile Court, The Chicago Psychopathic Institute, Chicago Half Orphan Asylum, School Medical Inspection Department (Board of Education), and Board of Health.

These various organizations, as their names imply, concern themselves with various problems presented by the child in the city. The work of the Infant Welfare Society, for example, is closely allied to that of the Hospital. This Society handled, during the year 1915, about 9,000 babies, whose management illustrates the value of "Preventive Pediatrics." Two of the twenty-one stations at which these infants are received are near the Hospital and available for teaching purposes.

This brief description of the Hospital will perhaps give an idea of the amount of clinical material available for study, and the machinery by which that material is made available for teaching. It makes it evident that in this Hospital are fulfilled the two conditions necessary for post-graduate teaching—namely, abundant and varied material, an institution properly equipped and organized.

It, therefore, seemed desirable to the Staff to broaden the Hos-



pital's sphere of influence by making possible a more widespread study of its abundant clinical material through the medium of post-graduate instruction. It was felt that benefit would accrue to various groups of people by the initiation of such a plan; to the patients from the more thorough study given them, as always in a teaching hospital; to practicing physicians from the opportunity to study intensively the diseases of infancy and childhood; to the patients of these practicing physicians through the increased knowledge of the latter; and, finally, to the Staff members themselves, from the self-improvement and stimulation always incidental to teaching. Special courses for physicians were, therefore, started in January, 1915, and have been continued ever since. The aim has been to make the courses as practical and the instruction as individual as possible; therefore, the classes are limited in number, the members are taken directly into the wards and laboratory, and encouraged themselves to make examinations of patients, themselves to do laboratory tests and investigations; for example, each member of the first class, four in number, himself did a lumbar puncture in a case of meningitis, and examined the spinal fluid by the usual routine tests. The same class also had instructive demonstrations at the post-mortem table, 17 of the 26 deaths during the six weeks' course coming to autopsy. All of these cases had been followed and studied clinically in the wards.

It is believed that, by these methods of instruction, practising physicians will receive that which they most need, viz., training in the close observation and *handling* of sick people, in the acquirement of the laboratory technique necessary to complete investigation and diagnosis, all tending to the development of thorough and exhaustive methods in the actual daily practice of medicine. For it is only by the application of thorough methods of study to our patients that we do our duty by them, that we minimize the number of our mistakes. Mistakes we all make. We are human beings, with finite and very limited knowledge. But *humiliating* mistakes we need not make, if we but avail ourselves of existing knowledge by applying it methodically, systematically and conscientiously in the care of our patients.

#### SUMMARY.

The principles discussed in this paper may be briefly summarized as follows:—

1. Post-graduate study and instruction in medicine are desirable both from a private and public point of view: from the private point of view, in that it enables the individual practising physician to keep himself informed as to progress in medical science, thereby making him a better workman and increasing his prestige and standing in his own community, and secondly, from the public

point of view, in that it ensures to the public well-trained and well-informed physicians—an inestimable benefit to any community.

2. The opportunity for physicians to keep themselves so informed is best found at a teaching hospital connected with the medical department of a university, such a hospital being located preferably in a large medical center, in order to ensure an abundance of clinical material.

3. To make this clinical material available for teaching, the hospital must be well organized and well equipped, the material well classified.

4. While opportunity should be provided for physicians to develop themselves into specialists and research workers, the greatest importance attaches to the needs and demands of the great body of general practitioners, as improvement of this large group results in more widespread benefit to the public at large. Therefore

5. Instruction should be made as practical as possible, patients being studied at the bedside and in the laboratory; and

6. The teaching should be as *individual* as possible; hence classes or groups should be small in number.

7. Under-graduates and post-graduates in medicine should not be taught in classes together, so different are the needs and demands of the two groups.

8. One of the most important branches of medicine to-day is pediatrics. All phases of child life, physical, mental and moral, individual and community, are being studied intensively. The well-informed physician can and must play an important part in this child welfare work, can and must do much to advance the cause of the child. Such advancement lays the surest foundation for the advancement of the race. Intelligent work among children is thus broad, comprehensive, far-reaching.

9. All phases of child life may be studied best at a children's hospital in a large city; either within the hospital itself or from the hospital as a center or clearing-house.

## OBSERVATIONS ON THE BLOOD-PRESSURE IN CASES OF DYSTHYROIDISM.

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In this paper I have brought together the blood-pressure observations made in 50 cases of dysthyroidism of varying degrees of intensity. The cases have been analyzed from the point of view of systolic blood-pressure, diastolic blood-pressure and pulse-pressure. I have also studied the various factors concerned in determining the functional capacity of the heart as described in the paper which I presented at the meeting of this Association in 1914.<sup>1</sup> I also include a single observation of the alterations in blood-pressure during and after a hemithyroidectomy. Observations were made every five minutes during the operation, and after the operation other observations were made at varying intervals for several weeks.

The blood-pressure observations were made with a Riva-Rocci instrument, except those marked \* which were made with a Tycos instrument. A 12 cm. cuff was used.

In a paper on the influence of carbonated brine baths on blood-pressure,<sup>2</sup> I adopted the figures of Woley<sup>3</sup> as normal; and in this paper I shall use the same standard for comparison. In 1,000 estimations of blood-pressure, in supposedly healthy individuals, Woley found that the average systolic pressure of persons from fifteen to thirty years of age was 122 mm.; of persons from thirty to forty years of age 127 mm.; of persons from forty to fifty years of age 130 mm.; and of persons from fifty to sixty years of age 132 mm. I have purposely chosen the averages for comparison rather than the average high or average low pressure.

One would expect to find a low systolic blood-pressure in cases of dysthyroidism, because Sanford and Blackford<sup>4</sup> found a marked fall in the systolic blood-pressure in the dog after the intravenous injection of extracts of strumas from cases of exophthalmic goitre. They also found that the serum of patients suffering from acute exophthalmic goitre produced a marked fall in the systolic blood-pressure. They found that one injection of the depressor substance found in the saline extract of the struma produced a tolerance against subsequent injections. They think that the same depressor substance which exists in the saline extract of the struma is present in blood serum of the patients suffering from the disease.



Fawcett, Rogers, Rahe and Beebe<sup>5</sup> experimented with watery extracts of fresh thyroid glands of pigs. They have also used the alcohol soluble residue and the alcohol insoluble residue. Injections were made intravenously. The alcohol soluble residue was the only substance that produced an appreciable effect on the blood-pressure in their hands. In their experiments no tolerance was produced.

Klose<sup>6</sup> succeeded in producing typical Basedow's disease in dogs by the injection of the fresh juice from a Basedow struma. He found a fall of 20 mm. in the systolic blood-pressure. Devic and Gardere<sup>7</sup> refer to some observations made by Hascovec, who demonstrated a reduction of the systolic blood-pressure after intravenous injections of thyroid fluid.

Upon the basis of Woley's figures, 21 of the cases in this series had a systolic blood-pressure which was normal for the age of the patients; 15 cases had a low systolic blood-pressure; and 14 cases had a high systolic pressure.

#### I. NORMAL SYSTOLIC PRESSURE CASES.

The cases in which, at the first examination, the systolic blood-pressure was normal for the age of the patient are 107a, 127d, 178a, 187, 299, 331, 383, 389, 438, 476, 486, 488, 499, 503, 518, 519, 520, 529, 537, 573, and 576 (Table I). Of these cases 10 showed, clinically, a more or less well-defined cardiac hypertrophy; one showed ventricular extrasystoles, and one presented pulsus bigeminus in addition to the cardiac hypertrophy.

In view of the fact that these cases presented cardiac hypertrophy, perhaps they should be classed with the low pressure cases, because, other things being equal, a cardiac hypertrophy is attended with an increase of the systolic pressure. Of these the pulse pressure was above 40 in 10; 40 or below in one; although in 2 the pulse pressure was 41 only. The cardiac efficiency factor was above 35 in 6, between 25 and 35 in 5. The overload factor was above 40 in 3; and gave a negative figure in 2. The percentage of the pulse pressure formed by the second phase was below 40, or could not be obtained in all.

Case 331 was a female, aged thirty-five. Ten months after the first examination was made her systolic pressure registered 85 mm.; pulse pressure, 38; cardiac efficiency, 44 per cent.; overload, 30 per cent. and the second phase formed 39.4 per cent. of the pulse pressure. The C. S.:C. W. ratio was as 65.7:34.1. This drop in systolic pressure was noted during a relapse, after symptomatic improvement. Five weeks later, after three weeks' rest in bed and two weeks living out of doors, her systolic pressure had risen to 105 mm. and three months later had returned to 120. The pulse pressure in this patient, which was originally 59 mm., fell with the

TABLE I.  
NORMAL SYSTOLIC PRESSURE.

Case	Sex	Age	Systolic	Diastolic	Pulse	C. E.	Overload	%—2nd phase	C.S.:C.W. Ratio	Time Interval
*107a	F.	49	130 148 164 170	80 90 104 104	50 58 60 66	38% 39% 36% 38%	12% 14% 7% 13%	16.0 10.3 20.0 12.1	56:44. — — —	6 days. 8 months. 15 months.
127d *178a 187	F. F. M.	28 30 27	120 118 126 *126 *160 *144 *142 *140 *130 *132 *124 *128	70 60 79 72 74 78 60 60 54 64 74 70	48 47 47 54 86 66 82 80 76 68 50 58	40% 37% 42% 42% 53% 45% 56% 57% 58% 51% 40% 45% 50%	0 9% 25% 66% 34% 86% 83% 90% 56% 17% 21% 53% 40%	10.0 4.1 59.5 51.8 23.2 54.5 26.8 30.0 28.9 26.4 32.0 20.6 30.3 51.7	60:39.9 70.7:29.1 82.9:16.9 66.6:33.3 53.4:46.4 66.6:33.3 41.4:58.4 62.5:37.5 52.5:47.3 41.1:58.7 48:52 55:44.7 45.4:54.5 72.3:27.4 61.0:38.8 61.2:38.8 80:20	5 months. 3 days. 24 hours. 24 hours. 24 hours. After dressing wound. 24 hours. 2 days. After dressing wound. 2 days. 2 days. 4 days. 2 days. 11 days. 22 months.
299	F.	40	127 124 129 146 120 124 118 123	75 80 80 80 70 80 78 64	37 49 49 66 50 44 40 59	29% 39% 38% 45% 41% 35% 33% 48%	—9% 15% 11% 32% 21% 5% 1% 42%	48.6 38.7 51.0 10.6 20.0 29.5 22.5 13.5	59.4:40.5 79.5:20.4 — — — — 82.5:17.5 55.8:43.9	9 months. 13 months. 17 days. 2 months. 1 month. 10 months. 38 days. 3 months.
331	F.	35	105 120 125	55 68 76	50 52 49	47% 43% 39%	40% 26% 14%	39.4 50.0 — —	65.7:34.1 — — —	10 months. 38 days. 3 months.
383	F.	38	125	76	49	39%	14%	—	—	—

\*The blood-pressure observations were made with a Riva-Rocci instrument, except those marked \* which were made with a Tyco's instrument. A 12 cm. cuff was used.

TABLE I—Continued.  
NORMAL SYSTOLIC PRESSURE.

Case	Sex	Age	Systolic	Diastolic	Pulse	C. E.	Overload	%—2nd phase	C.S.:C.W. Ratio	Time Interval
389	M.	32	121 125 128 150 120 127 126 105 120 125 135 *134 140 125 122 126 128 *148 139 *126 131 134 120 *128 *126 *126 *132 *130 97 128 105 90 100 120	70 80 69 75 79 95 85 74 71 70 85 80 90 65 80 68 63 90 60 78 74 87 85 80 76 90 90 90 90 65 80 65 50 62 79	51 45 59 75 41 32 41 31 49 55 50 54 50 60 42 58 65 58 79 48 57 47 35 48 50 36 42 40 32 32 48 40 40 38 41	42% 36% 46% 50% 34% 25% 32% 29% 40% 44% 39% 40% 35% 48% 45% 50% 39% 56% 38% 43% 34% 29% 37% 31% 28% 31% 30% 32% 37% 38% 44% 38% 34%	22% 6% 35% 50% 1% —17% —2% —9% 19% 28% 8% 17% 5% 42% 2% 35% 53% 14% 81% 11% 27% 4% —9% 10% 15% —10% —4% —6% —1% 10% 11% 30% 11% 1%	9.8 8.8 25.4 24.0 — 15.6 19.5 48.3 18.3 50.9 — — — 16.6 — 17.2 35.3 44.8 12.6 33.3 26.3 — 28.5 — 32.0 27.7 — — 15.6 8.3 22.5 25.0 21.0 —	64.7:35.2 64.3:35.5 81.1:18.5 76.0:23.9 — — — — 48.9:50.9 74.5:25.3 — — — — — 86.1:13.7 46.0:53.7 68.9:30.1 50.4:49.3 62.4:37.4 64.8:35.0 — 71.3:28.4 — 80:20 — — — — — — 45:55 71.0:28.8 —	16 months. 14 months. 3 months.  4 months. 2 months.  2½ months.   1 month. 7 weeks. 1 month. 2 months.  25 days. 1 week. 1 week. 1 week. 1 week. 10 days. 2 weeks. 3 weeks. 4 months.
438 476 486	M. M. F.	24 32 28								
488 499	M. F.	33 38								
503 518 519 *520 †529	F. M. M. F. F.	56 58 26 24 38								
537 573	M. F.	50 25								
576	F.	30								

†See special observations on blood pressure made during and immediately after hemithyroidectomy.



relapse to 38, and then increased to 50 mm. and 52 mm. The cardiac efficiency was always above 40 per cent. The second phase, which at first formed 13 per cent. of the pulse pressure, formed 50 per cent. at the third examination, but could not be obtained at the last.

Case 573 was a female, aged twenty-five. Her systolic pressure was fairly constant, 120 to 132 mm., except for three drops to 97 mm., 105 mm., and 90 mm. The first drop occurred when, after a period of four weeks' rest in bed, she was allowed to get up and was started on mild gymnastics. The second was coincident with two attacks of palpitation, an acute tonsillitis and constipation. The third without attending phenomena. The pulse pressure was usually about 40 mm.; on two occasions it was 48 mm. and on one, 50 mm. The cardiac efficiency factor was within normal limits six times in spite of a demonstrable hypertrophy, and above 35 per cent. on four occasions. The second phase was always below 40 per cent. of the pulse pressure.

Ten of the cases presented no clinical evidence of circulatory disturbance. The pulse pressure was above 40 in 9 of these, 40 or below in one, although in 2 the pulse pressure was 41 and 42 only. The cardiac efficiency factor was above 35 in 7 of these; between 25 and 35 in 3 (the same cases in which the pulse pressure was normal). The overload factor was not significant except in one case (476) in which it was —17. The percentage of the pulse pressure formed by the second phase was below 40 or could not be obtained in 8 cases and was above 40 in 2. These figures would seem to indicate that even with a normal systolic blood-pressure these cases showed evidences of functional disturbance of the myocardium.

In Case 107a, a normal systolic blood-pressure at the first examination was converted into a high pressure in six days. Then the pulse pressure had increased, the cardiac efficiency factor had increased and the second phase could not be obtained. Eight months later, after a hemithyroidectomy had been done by Dr. Tinker, at Ithaca, the systolic, the diastolic and the pulse pressures were still higher, the cardiac efficiency factor was nearer the high normal and the second phase had increased to 20 per cent. of the pulse pressure. Perhaps this patient belonged to the high pressure cases originally, and the low systolic pressure at the time of the first examination was due to the effects of an acute infection which was active at the time of the examination.

Case 178 had a normal systolic blood-pressure before his operation. Immediately after the operation, however, the systolic pressure increased to 160 mm.; the diastolic pressure remained at about the same point; the pulse pressure increased to 86 mm. The cardiac efficiency factor, which before the operation had been 42 per cent.,

had increased to 53 per cent.; the overload was 66 per cent., and the second phase, which had been 51.8 per cent. of the pulse pressure before the operation, had decreased to 23.2 per cent. By the time the patient left the hospital, however, the systolic pressure had returned to 128 mm.; the diastolic to 62 mm.; the pulse pressure to 66 mm. The cardiac efficiency factor was still 48 per cent.; the overload, 56 per cent., and the percentage of the pulse pressure formed by the second phase was not obtainable. This patient was examined one year and ten months after his operation, and his blood-pressure was quite normal: Systolic, 127; diastolic, 90; pulse pressure, 37; cardiac efficiency, 29 per cent.; load, —9 per cent.; second phase, 48.6 per cent.; C. S.: C. W.: 59.4:40.5.

One might conclude from this case that the blood-pressure disturbance was the direct result of the thyroid secretion and that the alterations in the myocardial factors were due to a functional disturbance.

In the cases then with a normal systolic pressure, at the first examination the pulse pressure was, as a rule, above 40 (18 out of 21 cases). The cardiac efficiency factor was above the normal in 13; within normal limits in 8. The overload factor appears not to be excessive. The percentage of the pulse pressure formed by the second phase is, as a rule, below 40 or cannot be obtained; 19 out of 21 cases. The cardiac efficiency factor is usually disturbed, whether or not clinically demonstrable organic disturbances exist in the circulation.

## II. LOW PRESSURE CASES.

The following cases were cases in which the systolic blood-pressure was below normal at the first examination (Table II): 180b, 266a, 312a, 386a, 430a, 483, 502, 509, 512, 543a, 548, 572, 579, 580 and 639. Cases 312a, 483, 509, 548, 580 and 639 had a clinically demonstrable hypertrophy of the heart.

Of the cases without a clinically demonstrable cardiac hypertrophy the pulse pressure was below 40 in 4 and 40 or above in 5. The cardiac efficiency factor was between 25 and 35 in one. It is necessary to say that of the cases in which the cardiac efficiency was above 35, one gave a factor of 36 and 2 of 38. If we omit these very slight percentages above normal, we still have 4 of these cases without demonstrable cardiac hypertrophy and with low systolic pressure in which the cardiac efficiency factor is beyond normal, and it would seem that even in such cases there is some definite disturbance of the myocardial function. Perhaps the variation in the pulse rate between the recumbent and the erect posture ought to have been studied in connection with these findings, but it appears to me that the cardiac efficiency factor is more dependable as an indicator of myocardial insufficiency than postural variations of the pulse rate.

TABLE II.  
LOW SYSTOLIC PRESSURE.

Case	Sex	Age	Systolic	Diastolic	Pulse	C. E.	Overload	%—2nd Phase	C.S.:C.W. Ratio	Time Interval
180b	F.	25	102	65	37	36%	6%	—	—	6 months.
266a	F.	35	105	65	40	38%	11%	—	—	
312a	M.	34	100	67	33	33%	-1%	36.3	66.6:33.3	
386a	F.	24	114	95	19	16%	-30%	—	—	
430a	M.	33	115	68	47	40%	19%	—	—	
483	F.	42	106	66	40	37%	10%	27.5	77.5:22.5	
502	F.	20	82	48	34	41%	20%	—	—	
509	F.	30	100	65	35	35%	3%	—	—	
512	F.	39	102	73	29	28%	-11%	24.1	65.4:34.4	
			100	60	40	40%	16%	15.0	—	
543a	M.	20	112	65	47	41%	22%	—	—	
548	M.	37	100	75	25	25%	-17%	40.0	—	
572	F.	36	115	65	50	43%	26%	—	—	
579	M.	26	109	67	42	38%	12%	45.2	76.1:23.8	
580	F.	43	109	72	37	33%	1%	—	—	
639	F.	49	125	84	41	32%	-2%	—	—	



The overload in these cases is not significant. The maximum overload was 26 per cent.; the minimum minus 30 per cent. I do not know that I have selected a suitable phrase for representing a cardiac load which is below 50 per cent.; but it seems practicable to refer to the overload as a minus factor when it is below the normal of 50 per cent.

In 8 of these cases the second phase of the auscultatory blood-pressure determination was below 40 per cent. or not obtainable. It was 40 or above in one case. This factor also indicates that in these cases there was a definite cardiac muscle disturbance.

When the C. S. C. W. ratio was obtainable, it was always on the side of cardiac strength; in one case 65.4:34.4, in another case 76.1:23.8.

Of the cases with a clinically demonstrable cardiac hypertrophy the pulse pressure was below 40 in 4 and 40 or above in 2. The cardiac efficiency was between 25 and 35 in 5 and above 35 in one. It would seem as though in these cases the hypertrophied muscle had produced a better myocardial efficiency. The overload in these cases was insignificant. The second phase was 36.3 per cent., 27.5 per cent. and 40 per cent. respectively in 3 cases. In the other 3 cases it was impossible to obtain the second phase percentage. In the 2 cases in which it could be worked out the cardiac strength was in excess of the cardiac weakness factor; 77.5:22.5 and 66.6:33.3.

In the cases in which the systolic pressure was below normal, there seems to be some difference depending upon the presence or absence of a clinically demonstrable cardiac hypertrophy not so much in respect to the pulse pressure as in respect to the cardiac efficiency factor. In the cases in which no cardiac hypertrophy could be determined, the cardiac efficiency factor was above 35 per cent. in eight out of nine instances. In those cases in which cardiac hypertrophy could be demonstrated this factor was within normal limits in five out of six instances. The percentage of the pulse pressure formed by the second phase was below 40 or not obtainable in 10 out of 15 cases.

### III. HIGH PRESSURE CASES.

The following cases at the first examination showed a systolic pressure higher than normal: 266, 270, 329, 346, 368, 387, 396, 432, 479, 506, 524, 543, 566, and 637 (Table III). Case 266 presented an arrhythmia. All the cases presented clinical evidence of cardiac hypertrophy, except cases 387, 524, and 566. In these cases at the first examination the pulse pressure was above 40 in all. The cardiac efficiency factor was above 35 in 13; in one it was 31 per cent. The overload was above 100 per cent. in 4; between 50 and 100 in 2; below 50 in 7; and a minus quantity in one. The

TABLE III.  
HIGH SYSTOLIC PRESSURE.

Case	Sex	Age	Systolic	Diastolic	Pulse	C. E.	Overload	%—2nd Phase	C.S.:C.W. Ratio	Time Interval
*266	F.	59	152	40	112	73%	230%	30.3	51.1:48.2	24 hours.
*270	F.	48	138	64	74	53%	65%	32.4	78.3:21.6	
329	F.	23	184	98	86	46%	37%	23.2	65:34.8	
346	F.	54	134	66	68	50%	53%	25.0	65.8:34.0	
			*244	130	114	46%	37%	52.6	87.6:12.2	
			182	105	77	42%	28%	11.6	89.5:10.2	1 month.
			182	102	80	43%	28%	27.5	65:35	3½ months.
			196	105	91	46%	36%	16.4	—	2½ months.
			182	105	77	42%	23%	—	—	6 months.
			210	105	105	50%	50%	12.3	74.2:25.6	7 months.
			215	95	120	55%	76%	20.8	79.9:19.9	1 month.
			189	100	89	47%	39%	11.2	—	1 month.
*368	F.	19	142	56	56	53%	50%	31.5	81.5:31.5	
387	F.	39	140	82	58	41%	20%	37.9	72.3:27.4	
396	F.	40	*180	48	132	53%	225%	21.2	74.2:25.7	
			*154	82	72	46%	37%	27.7	—	43 days.
			*144	76	68	47%	39%	32.5	76.4:23.5	4 months.
			164	90	74	45%	32%	6.7	—	6 months.
			170	90	80	47%	38%	23.7	83.7:16.2	5 months.
*432	F.	32	174	98	76	43%	27%	42.1	84.2:15.7	
479	F.	43	148	86	62	41%	22%	29.0	67.7:32.2	
			215	120	95	44%	29%	—	—	5 weeks.
			*206	130	76	36%	8%	36.8	86.8:13.0	1 week.
			*204	118	86	42%	22%	6.9	—	9 days.
			*198	120	78	39%	15%	15.3	—	3 days.
			*196	112	84	42%	25%	—	—	4 days.
			*196	114	82	41%	21%	31.7	87.7:12.1	1 week.
			*176	124	52	29%	—9%	—	—	5 days.
			*200	128	72	36%	6%	—	—	After walking.
			185	102	83	44%	31%	3.6	—	11 days.
			185	109	76	41%	19%	6.5	85.4:14.4	2 weeks.
			176	105	71	40%	17%	—	—	3 weeks.
			155	95	60	38%	13%	50.0	83.3:16.6	1 month.
			185	105	80	43%	26%	31.2	81.2:18.7	3 months.
			200	119	81	40%	18%	9.8	86.3:13.5	5 months.
			194	112	82	42%	23%	23.1	—	15 days.
			195	105	90	46%	35%	—	—	2 weeks.
*506	F.	54	170	60	110	64%	133%	12.7	59.9:39.9	

\*The blood-pressure observations were made with a Riva-Rocci instrument, except those marked \* which were made with a Tycoos instrument. A 12 cm. cuff was used.

TABLE III—Continued.  
HIGH SYSTOLIC PRESSURE.

Case	Sex	Age	Systolic	Diastolic	Pulse	C. E.	Overload	%—2nd Phase	C.S.:C.W. Ratio	Time Interval
524	M.	61	152	80	72	47%	40%	8.3	83.3:16.6	1 week.
			154	90	64	41%	21%	—	—	5 weeks.
			152	86	66	43%	26%	18.1	75.6:24.1	2 weeks.
			150	80	70	46%	37%	—	—	3 weeks.
			184	95	89	48%	43%	—	—	10 weeks.
			142	75	67	47%	39%	20.2	81.9:17.9	3 weeks.
			142	80	62	43%	27%	37.3	67.1:32.8	10 weeks.
			145	76	69	47%	40%	24.1	88.6:11.2	1 month.
			127	65	62	48%	45%	17.3	79.6:20.1	1 month.
			135	65	60	48%	57%	40.3	72.5:27.3	1 month.
			155	70	80	51%	56%	20.0	77.1:22.8	17 days.
			162	75	80	51%	56%	17.5	85:14.9	2 months.
			162	85	77	47%	40%	16.8	88.2:11.5	13 days.
			165	90	75	40%	33%	17.3	83.9:15.9	1 week.
			155	75	80	51%	56%	43.7	83.7:15.9	3 weeks.
543	F.	47	144	87	57	39%	15%	31.5	77.1:22.7	1 month.
			*166	90	76	45%	34%	13.1	68.3:31.5	25 days.
			*194	68	126	64%	135%	39.6	79.2:20.6	3 weeks.
			*188	86	102	54%	68%	3.9	88.2:11.7	1 week.
			*156	74	82	52%	60%	29.2	77.9:21.8	1 week.
			*154	76	78	50%	52%	2.5	79.4:20.4	1 week.
			137	62	75	54%	70%	—	—	1 week.
			165	60	105	63%	125%	17.1	71.3:28.5	19 days.
			*158	76	82	52%	57%	—	—	24 hours.
			*160	80	80	50%	50%	27.5	82.5:17.5	8 days.
			*152	86	66	43%	26%	18.1	—	10 days.
			*170	80	90	52%	62%	17.7	84.3:15.5	1 week.
			*174	90	84	48%	43%	—	—	8 days.
			*158	86	74	45%	33%	—	—	8 days.
			155	65	90	58%	88%	—	—	2 weeks.
			155	70	85	54%	51%	—	—	3 weeks.
566 637	F. M.	35 57	134	58	76	56%	81%	—	—	4 weeks.
			160	60	100	62%	50%	—	—	7 weeks.
			174	60	114	65%	140%	—	—	2 months.
			*182	70	112	61%	110%	17.8	80.3:19.5	2 weeks.
			*162	60	102	63%	120%	—	—	6 days.
			*192	80	112	58%	90%	—	—	2 weeks.
566 637	F. M.	35 57	*146	100	46	31%	—4%	39.1	—	2 weeks.
			148	75	73	49%	27%	17.8	82.1:17.7	2 weeks.

†First point absent.



second phase of the auscultatory blood-pressure determination was 40 per cent. or more in 4 cases, and could not be determined or was below 40 per cent. in 10 cases. The C. S. C. W. factor was on the side of cardiac strength in 12 cases and was unobtainable in 2 cases. In 2 of the cases, while the patient was under treatment, the systolic blood-pressure gradually returned to normal limits—namely, cases 266 and 543; but in the latter case it again became high. It appears to be the rule, however, that in a case in which a high systolic pressure is determined at the first examination, permanent organic changes have taken place in the heart, kidneys or arterial system.

Case 266 apparently shows a reduction of systolic pressure under treatment. When the patient was first seen she had an arrhythmia, which was diagnosed by clinical methods as auricular fibrillation, and a systolic pressure of 152 mm.; pulse pressure, 112; cardiac efficiency, 73 per cent.; overload, 230 per cent. In twenty-four hours without treatment, except rest in bed and a cathartic, her systolic pressure was 138 mm.; pulse pressure 74; cardiac efficiency, 53 per cent., and overload, 65 per cent. The patient then passed out of my immediate care, although the subsequent history was that she was operated upon first one month later, when the right superior thyroid artery was ligated and cut, and a second time, three months after the first operation, when the left superior thyroid artery was ligated and cut. Both operations were done by Dr. M. B. Tinker. The patient died suddenly, nine days after the second operation, probably on account of the auricular fibrillation.

Case 543 was a female, aged forty-seven. When first seen she had a systolic blood-pressure of 194 mm.; a pulse pressure of 126; a cardiac efficiency of 64 per cent. and an overload of 135 per cent. She was under my care in the Rochester General Hospital for about six weeks, when she was allowed to go home. By that time her systolic pressure had been reduced to 154 mm.; pulse pressure to 78; cardiac efficiency to 50 per cent. and cardiac overload to 52 per cent. A week later her systolic pressure was 137 mm.; pulse pressure 75; cardiac efficiency, 54 per cent. About two weeks after that she began to present symptoms of a recrudescence, her systolic pressure had increased to 165 mm., pulse pressure to 105, cardiac efficiency to 63 per cent. and overload to 125 per cent. She returned to the hospital where she was under treatment twenty-five days. Her systolic pressure was still 175 mm.; pulse pressure, 90; cardiac efficiency, 52 per cent. During the next four months her condition improved steadily, and at the end of that time her systolic pressure was 134 mm.; pulse pressure 76; cardiac efficiency 56 per cent. and overload, 81 per cent. The next month, however, the systolic pressure had returned to 160 mm. Later, coincidentally with a coryza, she had an increase in her symptoms and the systolic pres-

sure rose to 182 mm.; pulse pressure to 112; cardiac efficiency to 61 per cent. This patient has had albuminuria from time to time, but casts have never been found.

In the Cases in which the systolic pressure was higher than normal, the pulse pressure was above 40 in all. The cardiac efficiency factor was above normal in 13 out of 14 cases. The overload was above 50 per cent. in 6 out of 14 cases. The percentage of the pulse pressure formed by the second phase was below 40 in 10 out of 14 cases. It appears to be the rule that in a case in which a high systolic pressure is determined at the first examination, such organic changes have taken place in the heart, kidneys or arterial system that it is impossible to restore a normal condition to the circulation.

In case 529 I was able to study the blood-pressure during hemithyroidectomy, performed by Dr. D. G. Hastings in the Rochester General Hospital. The patient was a female, aged thirty-eight, who was employed as an auditor in one of the department stores. When she was first seen she had had thyroid gland disease for about three years and complained of nervousness, headache, dyspnea, palpitation of the heart, pounding in the chest, a sensation of crawling on the skin, and flashes of heat. The physical examination showed cutaneous erythema, exophthalmos, dermatographia, cyanosis, tremor of the tongue, slight hypertrophy of the heart, accidental murmurs, palpable liver edge, rapid pulse (140), pyorrhea alveolaris, and high palatine arch. She was admitted to the Rochester General Hospital in May, 1914. After four weeks of hygienic treatment with medication, the systolic blood-pressure was 148 mm.; diastolic pressure, 90 mm.; pulse pressure, 58; cardiac efficiency, 39 per cent.; second phase, 44.8 per cent.; C. S.:C. W.:68.9:30.1; overload, 14 per cent. She was allowed to leave the hospital at the end of six weeks, improved in all of her symptoms, except the tachycardia. Three weeks later she had a nervous attack with diarrhea and her pulse rate was again 140 per minute. She was readmitted to the Rochester General Hospital in August, at which time the following blood-pressure observations were recorded: Systolic, 139; diastolic, 60; pulse pressure, 79; cardiac efficiency, 56 per cent.; second phase, 12.6 per cent.; C. S.:C. W.:50.4:49.3; overload, 81 per cent.

The right lobe and one-half the isthmus were removed by Dr. Hastings, under ether anesthesia, on August 13th. Before the operation systolic pressure, 158 mm.; diastolic, 98; pulse pressure, 60; cardiac efficiency, 37 per cent.; second phase, 26.6 per cent.; C. S. C. W. ratio not obtainable; overload, 11 per cent. The cuff of a Tycos sphygmomanometer was applied to the left arm as soon as anesthesia was complete, and blood-pressure observations were made every five minutes during the operation. The systolic pressure had risen to 180 mm. after etherization and remained high until, following a rather sharp venous hemorrhage, it fell to 166 mm. It

then continued to fall, and after the gland was removed and the closure of the wound was being attended to it fell to 124 mm. Then 1 c.cm. camphorated oil was injected and one gallon of oxygen was given, followed by a gradual rise to 134 mm. The camphorated oil was then repeated and 500 c.cm. normal saline were given by hypodermoclysis. By 5:35 p. m. of the day of operation the systolic

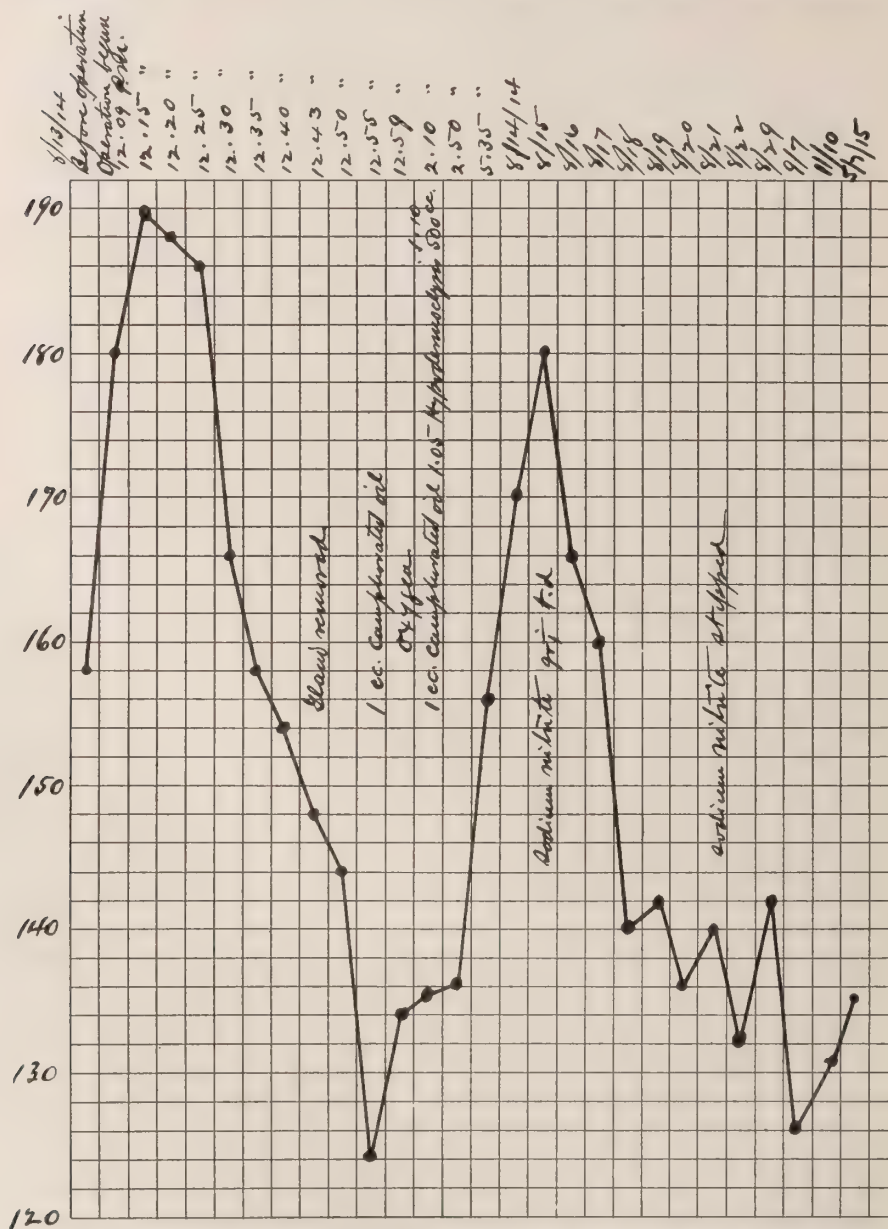


Chart I.—Systolic blood-pressure curve, Case 529 during and after hemithyroidectomy.



pressure had returned to 156 mm. The following day it had reached 170 mm. and it continued high for two days. Then, following the administration of sodium nitrite, gr. i, t. i. d., it gradually fell to 140 mm., when the sodium nitrite was stopped. When the patient left the hospital on September 7th the systolic pressure was 126. After two months spent in a convalescent home at Bath it was 131 mm.

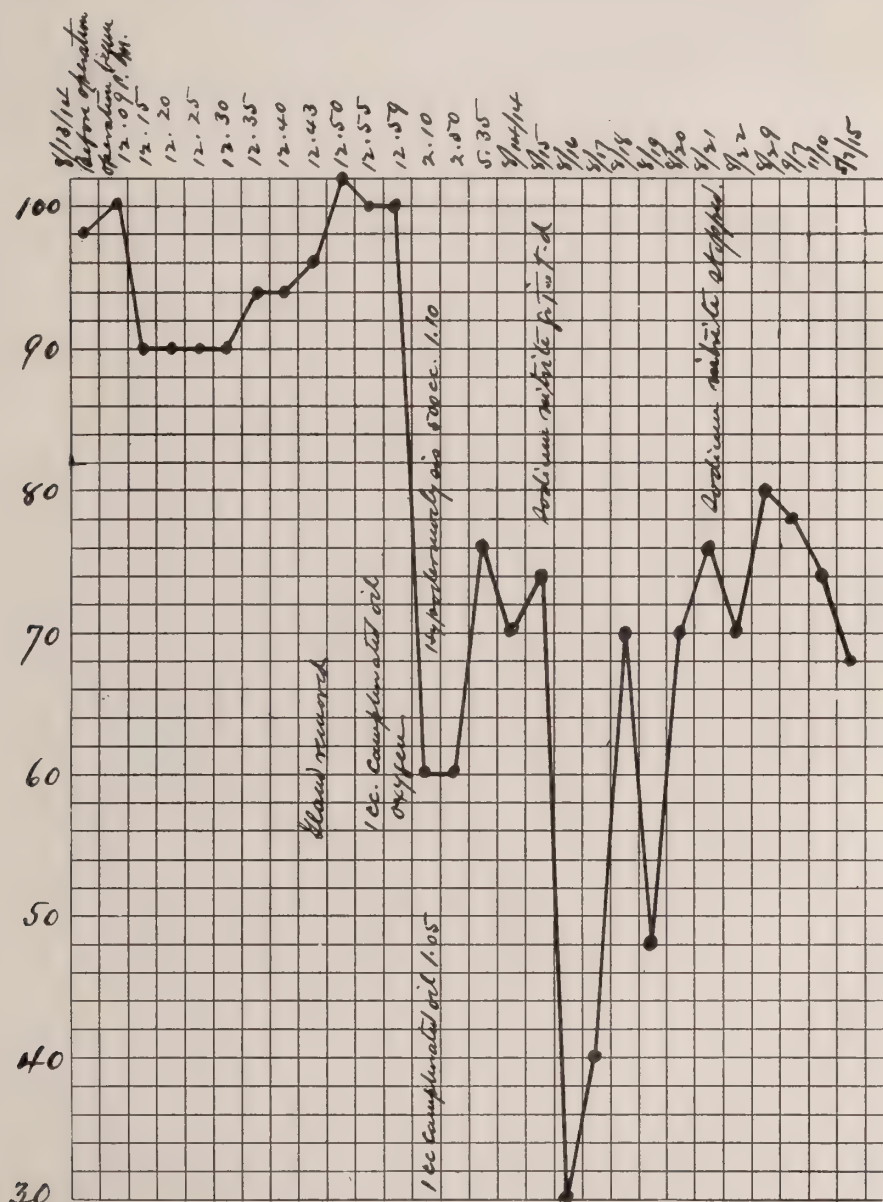


Chart II.—Diastolic blood-pressure curve, Case 529, during and after hemithyroidectomy.



and continued to rise until after the sodium nitrite was begun, when it began to fall and finally registered 59 mm.

It would seem that the manipulation of the thyroid body in hemithyroidectomies is followed by a fall in systolic pressure, a rise in diastolic pressure and a fall in pulse pressure. In this case the administration of camphorated oil, oxygen, and hypodermoclysis was accompanied by a rise in the systolic pressure, a fall in the diastolic pressure, and a gradual rise of the pulse pressure. In this case the administration of sodium nitrite by mouth was followed by a fall of the systolic pressure, a fall of the diastolic pressure and a fall of the pulse pressure.

I saw this patient nine months after her operation. She is apparently well. A blood-pressure observation made in the recumbent posture with a Riva-Rocci instrument was as follows:—

1st point, 135; pulse pressure, 67.

2nd point, 125; cardiac efficiency, 49 per cent.

3rd point, 97; 41.7 per cent., Cardiac overload, 48 per cent.

4th point, 70; C. S.:C. W.:81.9:17.8.

5th point, 68.

Pulse, 118, recumbent.

The pulse pressure was still high; the cardiac efficiency was above normal and the overload was high. While the patient was fairly well and comfortable, she could by no means be thought, clinically, to have a normal circulation.

An interesting question arises which cannot, of course, be settled by the observation of a single case. Are the fluctuations of blood-pressure due to the operation *per se* or to the manipulation of the thyroid gland? It would seem that the fall of systolic pressure may be attributed to the forcing of thyroid secretion into the vessels by the manipulation of the thyroid body. This corresponds to the influence of the intravenous injection of thyroid extracts into dogs reported by Sanford and Blackford.

Table IV shows the influence of an acute infection and rest in bed on one of the high pressure cases. The patient was a male, aged sixty-one, whose systolic pressure at the first examination was 184 mm. During a course of treatment his systolic pressure registered at one time as low as 127 mm.; but just before the acute infection began in March, 1915, the systolic pressure was 166 mm. The acute infection was ushered in at that time by distension of the stomach, tired feeling, a temperature of 101° and numerous extrasystoles. After twenty-four hours in bed the systolic pressure was 146 mm. The patient had a typical influenzal attack with laryngitis, accompanied by bilateral purulent otitis media necessitating the puncture of both ear drums. During this acute infection and resulting confinement to bed the patient's systolic pressure was constantly below 150 mm., except on one occasion when it was 158 mm..





following the puncture of one of the ear drums. The pulse pressure, the cardiac efficiency and percentage of the pulse pressure formed by the second phase showed no very great fluctuations from figures obtained before the acute infection began. The cardiac overload varied from 13 to 39 per cent.

#### CONCLUSIONS.

From the study of these cases it seems legitimate to conclude that the first effect of dysthyroidism on the blood-pressure is to produce a lowering of the systolic pressure. This is accompanied by a disturbance in the pulse pressure, usually an increase. After the case has persisted for a varying period, the systolic blood-pressure begins to rise, and, after the development of cardiac hypertrophy and renal and vascular changes, the cases are converted into typical examples of chronic hypertension.

The study of the various functional myocardial tests would seem to show that the myocardium is disturbed in nearly all cases, whether or not there is clinical evidence of such disturbance.

During the operation of hemithyroidectomy in one case there was a sharp fall of systolic pressure and pulse pressure and a rise in diastolic pressure. After the operation the systolic pressure again rose to a high point; but after the use of sodium nitrite it returned to a more nearly normal figure.

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## A NOTE ON SUPERFETATION.

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Whether or not superfetation occurs in the mammalia, including the human species, remains an unsettled question. Cases interpreted as superfetation are reported not infrequently by medical practitioners. Therefore, the problem is one which justly claims our attention.

In order to admit the possibility of superfetation we must admit the following assumptions:—

1. That ovulation may occur during pregnancy.
2. That spermatozoa may remain viable in the Fallopian tubes for relatively long periods, or that they may ascend the uterus in spite of the presence of one or more developing fetuses and come in contact with ova which might be present.
3. That changes in the uterine mucosa, which would make possible the development of a second placenta, are not inhibited during pregnancy.

That the corpora lutea normally inhibit ovulation during pregnancy has been determined experimentally. Nevertheless, it is well known that in the human species menstruation may recur at regular intervals up to the fifth month of pregnancy. Whether ovulation accompanies menstruation in these cases is not known. Cosen-tino, in 1897, claims to have demonstrated ripe Graafian follicles in the ovaries of a woman who died about the sixth month of pregnancy. Ovulation during pregnancy in the cow is reported by Pouchet (1840). Christopher, in 1886, demonstrated ripe Graafian follicles in the ovaries of a pregnant cat approaching full term. That ovulation sometimes occurs during pregnancy has been maintained also by others.

That spermatozoa may, under favorable conditions, remain viable for relatively long periods in the female genitalia is well known. Regarding the assumption that spermatozoa may ascend the uterus during pregnancy, little direct evidence is available. However, this assumption is of little theoretical importance and might well be admitted at least during early pregnancy.

The third assumption stated above has been considered by few investigators. Sirtori, in 1906, basing his conclusions on histological observations, stated that a second ovum may become implanted in the uterine mucosa while the decidual reaction is still



slight, *i. e.*, during the earliest stages of pregnancy. Loeb, in 1912, found, experimentally, that the uterine mucosa of pregnant guinea-pigs cannot be stimulated to form a new decidua. He concludes, therefore, that an inhibiting influence is exerted during pregnancy on the cyclic changes in the uterine wall; consequently, the implantation of additional ova in a uterus already pregnant becomes impossible.

Theoretically, superfetation requires the concurrence of several favorable conditions which, according to experimental evidence, do not normally obtain. Nevertheless, the possibility that under abnormal or pathological conditions superfetation may occur is not precluded.

Loeb, in 1912, showed that pregnancy in guinea-pigs does not prevent early ovulation after excision of the corpora lutea. Therefore, if for any reason the corpora lutea should fail to perform their normal functions, the first condition stated above which would favor superfetation would be fulfilled.

As stated above, spermatozoa may under favorable conditions remain viable for a relatively long period in the female genitalia. That spermatzoa may ascend the uterus during early pregnancy may probably be admitted without difficulty. Although in the human species the cervix is closed early in pregnancy by a plug of mucus, it has never been demonstrated that this is an effective barrier in the path of spermatozoa. As pregnancy advances the tubes are, doubtless, under normal conditions closed to the entrance of spermatozoa. However, in the case of a bifid uterus a fetus located in one horn would not necessarily occlude the other horn. Likewise, the presence of one or more fetuses in one horn of a bicornuate mammalian uterus does not necessarily occlude the other horn. It is not impossible, therefore, that conditions might obtain which would permit spermatozoa to ascend the uterus even during advanced pregnancy.

The implantation of the ovum and the formation of a new decidua in a uterus already pregnant offer the most serious theoretical difficulties. If, as Loeb finds, the cyclic changes in the uterine mucosa are inhibited during pregnancy, the implantation of an ovum in a uterus already pregnant becomes impossible. While such inhibition occurs normally, it is not inconceivable theoretically that, under certain conditions, the mucosa of a uterus already pregnant might still be stimulated to form a new decidua.

In view of the complex of conditions which must be assumed in cases of superfetation, but which do not normally obtain, the probability that all of these conditions have concurred in any given case must be very slight. Nevertheless, the data at hand does not warrant a categorical denial of the occurrence of superfetation.

As indicated above, not a few cases which have been interpreted

as cases of superfetation are recorded. In the Index Catalogue of the Library in the Surgeon General's Office, United States Army, not less than two hundred references are catalogued under this general head. The great majority of these refer to cases which have been interpreted as cases of superfetation. With few exceptions these cases have occurred in the human species. A search of the literature reveals relatively few cases which have been interpreted as superfetation in animals. In very few of the recorded cases has the evidence been critically examined, and it is safe to say that many of them would not bear investigation. The majority of the human cases are cases in which two fetuses of unequal size were aborted. Less frequently the delivery of a child of full term and a dead fetus of less than full term is reported. A few cases have been reported in which a living child of full term and one of less than full term were delivered at the same time. Isolated cases have been reported in which the delivery of a second child followed that of the first after an interval of several weeks or months.

Before considering the reported cases further, we will present the facts revealed in the cases of two cats examined by the writer. These cats were killed with illuminating gas for laboratory purposes. When the abdominal cavity of the first cat was laid open, the uterus was found to contain two fetuses of nearly full term and two smaller ones approximately 10 mm. in length. One of the larger fetuses was located in either horn of the uterus just above the bifurcation; one of the smaller ones was located in either horn of the uterus somewhat farther anteriorly. All the vesicles with their placenta appeared quite normal. The placenta of the larger fetuses were highly vascular; those of the smaller ones, though apparently well supplied with blood, showed relatively small blood-vessels. The chorionic vesicles containing the smaller fetuses were less than one-fourth the size of those containing the larger ones. The small size of the blood-vessels supplying the uterine placenta of the smaller fetuses was, therefore, not considered of particular significance. The gross appearance of the uterus with the four fetuses *in loco* seemed to indicate clearly a case of superfetation.

When the uterus was laid open the fetal membranes of the smaller as well as the larger fetuses were intact and turgid with the contained fluid. The fetal placenta of the smaller fetuses were obviously less vascular than those of the larger ones. The chorionic fluid in the smaller vesicles was apparently normal; the amniotic fluid was slightly coagulated.

The smaller fetuses were removed from the fetal membranes and immediately placed in Zenker's fluid. The one in the right horn of the uterus measured 10 mm. in length. It was perfectly intact and appeared entirely normal. The one in the left horn was some-

what smaller. It also showed a lesser deflection of the head and a slight distortion in the lumbar region. One of the larger, and both the smaller fetuses are illustrated in the accompanying illustrations (Figs. 1, 2 and 3).

Both ovaries of the cat, the smaller fetuses and parts of the placenta of both the larger and the smaller fetuses were sectioned, stained and examined microscopically.



Fig. 1.—Fetus of nearly full term, natural size.

*Ovaries.*—The ovaries were entirely normal. Each contained two well-developed corpora lutea, all of which presented the same microscopic picture, and were, therefore, apparently of the same age. This is what we should have expected if the four follicles ruptured at the same period of ovulation. If superfetation had occurred we should have expected to find one of the corpora lutea in each ovary in an earlier phase of development than the other. It might be argued that even though one of the follicles in each ovary ruptured



at a later period of ovulation than the other, the corpus luteum might still have had sufficient time to attain its maximum development; consequently, both corpora lutea show the same microscopic picture. While this possibility must not be overlooked, it is highly improbable, in view of the early phase of development represented by the smaller fetuses, that these corpora lutea are not of the same age.

*Embryos.*—Microscopic examination of the embryonic tissues reveals well-marked necrotic changes. As is characteristic of necrotic tissues, they fail to respond readily to basic stains. The majority of the nuclei are sufficiently well preserved to retain their normal form. The stainable chromatin material contained in the



Fig. 2.—Dead fetus located in right horn of uterus, actual length 10 mm.



Fig. 3.—Dead fetus located in left horn of uterus, actual length 9 mm.

nuclei is appreciably less than normal; consequently, they appear relatively colorless.

The fundamentals of the central nervous system and the visceral organs indicate a normal early development. A shrunken remnant of the notochord persists, around which condensations of mesenchymal cells indicate the fundamentals of the vertebræ. The heart and many of the blood-vessels contain red blood-cells which retain their nuclei. In some areas blood-cells are found scattered in the tissues. The endothelium of the blood-vessels is no longer intact and endothelial cells and fragments of mesenchymal tissue are found among the blood-cells in their lumina. The epithelial lining of the digestive tube shows similar disintegration. In the central nervous system the characteristic arrangement of nervous and supporting elements

is not apparent. The ependymal layer is more or less fragmented and the entire canal, including the vesicles of the brain, is filled with partially disintegrated cells and tissue debris. Some of the cells in the spinal ganglia reached a stage of differentiation, before becoming necrotic, in which they may be recognized as neuroblasts. Nerves may be traced peripherally, but their fibers are fragmented. Fig. 4 is a photographic reproduction of a section of the neural tube and surrounding tissues taken from the embryo in the right



Fig. 4.—Photomicrograph of transverse section of neural tube and adjacent tissues in fetus illustrated in Fig. 2.

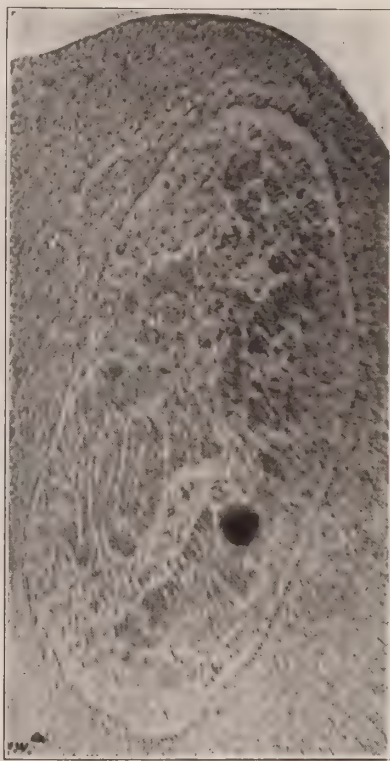


Fig. 5.—Photomicrograph of transverse section of neural tube and adjacent tissues in fetus illustrated in Fig. 3.

horn of the uterus. Fig. 5 is a similar picture taken from the embryo in the left horn of the uterus. These pictures indicate a somewhat more advanced stage of necrosis of the tissues of the embryo in the left than of those of the embryo in the right horn of the uterus.

*Umbilical Cord.*—Sections of the umbilical cord show an advanced stage of necrosis, and the umbilical vessels gorged with embryonic blood (Fig. 6).

*Amnion.*—The amnion is well preserved but obviously necrotic.

The epithelium is no longer intact. The amniotic mesoderm shows relatively few lightly staining nuclei and areas of hyaline degeneration.

*Placental Chorion.*—The placental chorion is well preserved but shows extremely few blood-vessels. Parts of the chorionic epithelium remain intact, while other parts are desquamated. Decidual cells were not observed. The chorionic villi show more extreme degeneration than do either amnion or chorion. They are of the type commonly found in younger placentæ. The epithelium where present is partially disintegrated and cannot be clearly differentiated into a syncytial and a basal layer. In many areas the epithelium is entirely wanting. The connective-tissue within the villi shows varying degrees of disintegration, and usually complete absence of

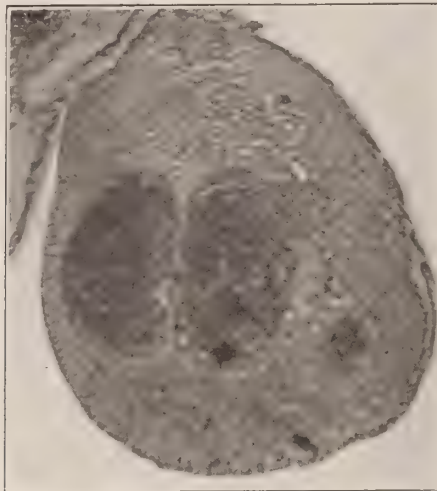


Fig. 6.—Photomicrograph of transverse section of umbilical cord of fetus illustrated in Fig. 2.

blood-vessels. Immediately surrounding the villi, and in many instances replacing the epithelium, is a fibrinous network of varying density. The intervillous spaces contain very little blood.

*Decidua Basalis.*—The decidua basalis also shows varying degrees of degeneration. Some areas show advanced necrosis, while in others only initial necrotic changes are apparent. There is a striking absence of blood in the sinuses and all blood-vessels are relatively small.

In view of the microscopic pictures presented by these embryos and placental tissues, it is obvious that we are dealing with fetuses which were retained in the uterus for a considerable period in a non-living condition. The maximum development attained by these embryos indicates an age of probably less than four weeks. Whether



development ceased abruptly or whether the blood-supply was cut off gradually and development retarded for some time before life ceased, cannot be determined. However, it is probably safe to assume that these fetuses were carried in the uterus as dead bodies not less than three or four weeks. In any event, the case presents no evidence which would warrant the conclusion that the two smaller fetuses resulted from the fertilization of two ova at a time when the uterus was already pregnant. It cannot, therefore, be interpreted as a case of superfetation.

The uterus of the second cat contained two fetuses 7 cm. in length and two smaller ones representing a stage of development not later than the closure of the neural tube. One of the larger and one of the smaller fetuses was located in either horn of the uterus; the larger one just above the bifurcation, the smaller one farther anteriorly. The placentæ of the smaller fetuses were apparently quite as well supplied with blood as those of the larger ones. The difference in the size of the blood vessels supplying the uterine placentæ of the larger and the smaller fetuses was less marked than in the case described above. The gross appearance of the uterus with the four fetuses in loco seemed to indicate superfetation even more clearly in this than in the preceding case.

Both ovaries of the cat, the smaller fetuses and parts of the placentæ were fixed in Zenker's fluid, sectioned, stained and examined microscopically.

*Ovaries.*—Each ovary contained two corpora lutea all of which presented the same microscopic picture and were, therefore, apparently of the same age. They had not yet attained their maximum development, but showed evidence of active normal growth. They still remained highly vascular; the luteal cells were relatively large and showed evidence of active proliferation. These facts indicate that the four follicles represented by two corpora lutea in each ovary ruptured during the same period of ovulation. Therefore, we must conclude that the development of both the larger and smaller fetuses was initiated approximately at the same time.

*Embryos.*—Microscopic examination of the smaller embryos indicates an early cessation of development. The cells show less advanced necrotic changes than do the cells of the embryonic tissues described in the preceding case. They still react readily to basic stains. However, there is almost complete absence of differentiation; not even the fundamentals of the central nervous system can be clearly recognized.

*Fetal Membranes and Placentæ.*—Both amnion and chorion are well preserved, but show evidence of early necrosis. Well marked degenerative changes are not apparent in the placental tissues.

The microscopic pictures presented by these early embryos indicate that they were retained in the uterus for a considerable period

as non-living bodies. This fact and the fact that both corpora lutea in each ovary represent the same phase of relatively early normal development warrant the conclusion that both the larger and the smaller fetuses resulted from ova which were fertilized approximately at the same time. Obviously, this is not a case of superfetation.

A comparison of the findings here recorded with those recorded by Herzog (1898) in three human cases and Franco (1910) in one human case is not without interest. In the first case examined by Herzog a dead fetus of nearly full term and another 66 mm. in length were delivered. The larger fetus had obviously been dead for some time and was badly macerated. The smaller one was delivered with fetal membranes intact. Upon examination, after an interval of exposure, it was found to be compressed and macerated. Microscopic examination of the amnion, chorion and decidua associated with the smaller fetus showed that all these tissues had undergone marked degeneration. However, the author concluded that "there is very little, if any, reasonable doubt left that this placenta is younger than five full months, and, considering the state of preservation, that its embryo at the time of parturition could not have been dead more than two or three weeks. Since the larger fetus beyond doubt is one near full term, the case, therefore, has to be looked upon as one of superfetation."

In the second case examined by Herzog a fetus of about eight and one of about four weeks were aborted. These embryos were somewhat mutilated by handling before being subjected to careful study. After microscopic examination the author concluded that "the smaller, very much mutilated embryo did not furnish the absolute proof that it was four weeks younger than the larger one; there was, on the other hand, nothing found to show that the former had died before the latter."

In the third case examined by Herzog a fetus 6.2 cm. and another 16.5 mm. in length were aborted. It was estimated that the larger fetus was nine or ten weeks, the smaller five or six weeks old. Upon microscopic examination of both chorionic vesicles and the smaller embryo, the author found nothing to indicate that the smaller embryo was undergoing degeneration, and concluded that "it must have been alive shortly before expulsion." He, therefore, interpreted the case as one of superfetation. It is stated, furthermore, that "the woman in whom the superfetation occurred had never failed to menstruate during this whole pregnancy."

Franco in 1910 described a case in which a fetus of six months and another 8 mm. in length were aborted. The smaller fetus was well-preserved, with fetal membranes intact. As far as could be determined by macroscopic observation, there was nothing to indicate that the embryo was abnormal except a slight distortion in

the lumbar region. The age of this fetus was estimated at not over five or six weeks. If this were a case of superfetation at least four and one-half months must have intervened between the implantation of the first and the second ovum. Upon microscopic examination the tissues of the smaller fetus as well as its fetal membranes showed unmistakable evidence of advanced necrotic degeneration. The author concluded, therefore, that this is not a case of superfetation, but that the smaller fetus was carried in the uterus as a dead body not less than four and one-half months. The findings of Franco in this case are in full agreement with those of the present writer in the feline cases described above. The microscopic pictures in Franco's case indicate more advanced degeneration than do those in the cases described in this paper. Doubtless, this difference is due to the greater interval of time which elapsed in Franco's case between the death of the fetus and its removal from the uterus.

Had Herzog been willing to admit the preservation of dead fetuses in the uterus, he probably would not have interpreted the first and second cases referred to above as cases of superfetation. Yet it is well known that dead fetuses with fetal membranes intact are sometimes retained in the uterus for a long time without undergoing decomposition. Herzog's third case presents a somewhat different aspect. In the absence of any apparent degeneration in the smaller embryo, there seems to be no reason to doubt that the implantation of a second ovum might have followed that of the first after an interval of one menstrual cycle. However, it is not necessary to assume that such was the case. Indeed, it is quite as probable that both ova were implanted at the same time and that the development of one of the fetuses was retarded by reason of inadequate nourishment due to mechanical or other causes.

In view of the facts here presented it is highly probable that the majority of the cases reported, but not critically examined, in which two fetuses differing in size were aborted or a full term child and a fetus of less than full term were delivered should not be interpreted as cases of superfetation. Indeed, it may be doubted whether such an interpretation is warranted in any of these cases.

Regarding those cases in which a living child of full term and one of less than full term are delivered, the possibility that the development of one of the fetuses might have been retarded by reason of mechanical or other causes which tend to restrict the blood supply to the placenta must not be overlooked. In this connection the case reported by Flowers (1906) in which a white woman was delivered of an eight months' white female and a full term mulatto male baby is of peculiar interest. If we must assume that these two children have not the same paternal parent, the evidence for superfetation in this case seems convincing. However, it is not impossible that one



of fraternal twins by a white mother and a colored father might be white and the other a genuine mulatto.

Reported cases in which the birth of a second child followed that of the first, after an interval of a few weeks or months, are rare and in some instances not well authenticated. The only important condition presented by a case of this kind which does not obtain in cases in which a child of full term and one of less than full term are delivered at the same time is the remarkable fact that one fetus is retained in the uterus after the other is expelled. The fact that an interval of time intervenes between the birth of two children that occupied the uterus contemporaneously is in itself not proof of superfetation.

*Summary.*—In order to admit the possibility of superfetation we must assume the concurrence of a complex of conditions which do not normally obtain. Two cases of apparent superfetation in cats which were examined by the writer afford no evidence in favor of the occurrence of superfetation. In the majority of the reported cases which have been interpreted as cases of superfetation, such interpretation is unwarranted. Indeed, the occurrence of superfetation in the mammalia, including the human species, is doubtful.

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## INFLUENCE OF RECTAL DISEASES ON URINARY DIAGNOSIS.

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Who does not want to make the brilliant diagnosis where others have been baffled, for on such triumph rests a large part of one's reputation and success. Within the limited field of genito-urinary surgery are many such possibilities.

Correct diagnosis and, in consequence, correct treatment of genito-urinary disease call also for a proficient knowledge of rectal disease. Early in the practice of medicine one is soon impressed with the confusion of symptoms associated with these closely related organs. That this confusion need not be unexpected, we have only to remember that the nerve supply of the anus and rectum and the bladder are practically the same in the spinal cord. This accounts for the phenomenon observed when the patient often complains of bladder symptoms, when in fact he is suffering from a pathological condition of the rectum or anus, or believes he has rectal trouble when he is really afflicted with a genito-urinary disease. It is the purpose of this paper to call attention to this confusion of symptoms with complaint, a confusion which is very apparent especially to one who treats these conditions exclusively.

One of the most common and apparently one of the most harmless anal conditions is an itching anus. The patient complaining of an itching anus is usually dismissed with some simple soothing ointment without the physician going to the trouble of making a local examination. But let us consider what can be the deep-seated cause of an itching anus, aside from the usual external piles, or an unwashed condition, or disease within the rectum or anus which may be the cause and require an examination to determine. This itching may be caused by a number of conditions affecting the genito-urinary organs such as a stone in the bladder, chronically inflamed prostate, seminal vesicles, urethra, foreskin or bladder. Female patients complaining of pruritus ani may in reality be suffering from some disease of the uterus and tubes, or be subject to some irritating vaginal discharge. But this annoying trouble may also point to some general condition which finds expression through the urinary organs, such as uric acidosis, nephritis or even diabetes.

Constipation is a common disease in man. Its more remote effects are often overlooked by the profession at large. Constipation

means more than the difficult passage of hardened material. We get two principle effects, that from absorption of poisonous material back into the system, and thereby throwing an extra load upon the other excretory organs, and the other being the local pressure effect due to the overloading of the rectum and pelvic colon. From either of the two groups just mentioned we may have urinary symptoms. It is not expected in this paper to go into specific details; but the hope is that by calling attention to possible effects of these conditions when such effects are found, the possibility of a remote underlying cause may not be overlooked. Reversely, we may find rectal symptoms reflecting a urinary disease. I recall a patient, not long ago, who complained of a severe pain in the rectum which disappeared after I removed a bladder stone. It is not unusual to find a patient claiming to be constipated, who merely refrains from evacuating the bowels through dread of pain from some prostatic or bladder condition.

Patients may complain of constipation as the most prominent symptom, who are afflicted with a bladder stone, a stricture or some old urethral disease which has, through reflex spasm and subsequent hypertrophy of the sphincter muscles, brought on a rectal state causing constipation. I have at present a patient who has rather troublesome piles due to a tight stricture of the urethra, causing extreme straining and consequent congestion of the hemorrhoidal veins. Also another who has partial prolapse of the rectum caused by the effort necessary to overcome the obstruction of an enlarged prostate. Anything which mechanically obstructs the rectal cavity and interferes with the normal bowel movement will tend to induce delay in evacuation and hence constipation. In this way hypertrophy of the prostate, and prostatic abscess may exert a mechanical as well as a reflex influence upon the rectum. Willy Meyer, in 1901, reported a series of Bottini operations for enlarged prostate, wherein one result was relief of several cases of obstinate constipation.

Genito-urinary disturbance as a result of constipation has been frequently observed. Zobel, in a recent number of the *Proctologist*, calls to our attention that "congestion, irritation and various disturbances, both functional and organic, of the uterus, tubes and ovaries in the female, the vesicles, urethra and prostate in the male, and the bladder in both, may result from chronic constipation. This is due to the close proximity of the organs to the lower bowel and to their close physiological relationship."

The effect of constipation upon the urinary organs may be exerted through the pressure of the fecal mass upon the ureters, the neck of the bladder or the prostatic urethra. It has even caused suppression of the urine. The urine in chronic constipation is increased in quantity, the color is darker, and the solid constituents are in-



creased; oxaluria is one of the most constant features, or it may be loaded with urates.

As the urine is one of the vehicles used by nature to rid the body of its refuse poisons, the end-results of metabolism, it is not unexpected that where the efficiency of the bowels is interfered with, the kidneys would be called upon to do more than their duty. I have had a number of cases of colon bacillus infection of the kidney pelvis which would not materially improve until the coexisting constipation was improved. As a matter of routine examination Jelks subjects the urine from patients with constipation to a chemical and microscopical examination. He believes this important, owing to the relationship and association of diabetes, kidney insufficiency, and disease of the kidney with cases of atonic constipation.

Piles and prolapse of the rectum are very apt to be caused in elderly patients by enlargement of the prostate or stone in the bladder due to mechanical obstruction both of the bladder outflow and rectal outlet, the coincident straining and venous engorgement being the direct cause. Other conditions of the generative and urinary organs, which may be responsible for piles, are retroversion, anteversion, procidentia, cystitis and urethritis. In view of this fact patients suffering from piles should be examined also for evidence of these conditions before suggesting operative measures on the rectum, because relief of the causative conditions is usually followed by the disappearance of the piles, if the causative condition has not persisted too long.

Anyone familiar with the enlarged prostates of old age has noticed the almost constant presence of piles resulting from it. "The urinary and rectal straining lead to a venous engorgement of the prostate and the vesical neck, which not only acts as one of the main causes of sudden urinary retention, but when continued for some time or recurring frequently, leads to a dilated condition of the prostatic plexus. Incompetency of the valves in this plexus results. The blood is forced back through communicating branches and becomes dammed up in the internal pudic and the middle and inferior hemorrhoidal veins. Since all these, as well as the prostatic plexus itself, empty into the internal iliac vein, no real relief to the venous obstruction ensues; but hemorrhoids develop, and their pain add to the misery of the patient. Some slight relief might occur from vascular overflow into the superior hemorrhoidal veins; but as these are radicles of the portal system, which have no valves, and which are very apt to be already congested or obstructed in persons who have reached the prostatic age, the superior hemorrhoidal veins are only too often varicose even before the middle and inferior become so (Deaver).

When the prostate enlarges in the direction of the rectum it may seriously obstruct the rectal canal. This not only renders the

emptying of the bowel more difficult but favors the accumulation of fecal matter higher up.

Mummery, of London, calls attention to the not uncommon finding of a small ulcer in the anal canal as a cause of intractable sciatica. I have personally noticed a number of cases of 'sciatic' rheumatism associated with enlarged prostates bulging into the rectal cavity and undoubtedly producing irritation to the rectal branches of the sacral plexus which influence the sciatic nerve.

In the same way, pain may be referred to the genito-urinary organs. Cases are sometimes met with of 'bearing down' pain in women, referable to some rectal lesion; while irritability of the bladder is quite frequently seen as the result of rectal ulcers and even of such conditions as prolapsing piles. Complete retention of the urine may result from any painful lesion in the rectum. A good example of this is seen in cases of anal fissure.

Children often complain of an irritated condition of the bladder, with frequent urination and bedwetting. This is often due to the presence of hard masses in the rectum or to pinworms.

Fissure in ano may be a very painful condition. Anyone who has observed or experienced this condition will readily appreciate that the sufferer develops a marked tendency not to relax his sphincter muscles. The close relationship of the urinary sphincter to the anal sphincter makes it almost impossible for one to functionate without the other supporting it, so that the patient will dread the ordeal of even emptying his bladder. Tuttle notes that "inability to empty the bladder and painful urination are among the most frequent complications of anal fissure."

Any condition of the anus, rectum or pelvic colon which causes inflammation, irritation or painful function, such as chronic colitis, anorectal fistula, simple ulcer, acute catarrhal proctitis, superior pelvic rectal abscess, retrorectal abscess, ischiorectal abscess, diffuse septic periproctitis, tuberculosis of the rectum or stricture of the rectum, etc., are apt to cause symptoms referable to the genito-urinary organs. The urinary symptoms caused reflexly from any inflammatory condition of the anus, rectum or pelvic colon are practically the same, due allowance being made, of course, for difference in location.

## THE TINCTORIAL REACTION OF WHITE BLOOD CELLS.

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In a former communication\* the writer called attention to the observation that in many cases of colonic stasis with the symptoms of systemic absorption there was a rather uniform tinctorial reaction of the blood smears, a reaction that deviated quite markedly from the normal.

Since that time further observation has confirmed that report, but has also shown that the same reaction has occurred in other conditions also. In order to establish the uniformity of the reaction and the range of cases where it appears, a study of the records of nearly four hundred consecutive cases has been made.

After trying out the various polychrome stains it was found that Pappenheim's method of using the Mai-Gruenwald combined with the Giemsa stain gave the most uniform results. The greater number of these records were made with this stain.

For purposes of classification four types of staining reaction could be differentiated. The delimitation of each is, of course, not sharp but gradual. Hence the mental attitude of the observer must have something to do with the results. But granted an observer who tries to be fair, the differences are distinct enough to make a classification accurate within the limits of error usually permitted in such work.

The particular type of color reaction that did not seem to be subject to variation on account of the age of the smear, the heat of the room, or the duration of staining was this: The nucleus of the polymorphonuclear cell is stained rather heavily with the violet. The granules are large and apparently increased in number. They are stained a reddish violet. The cytoplasm takes on a tint that varies from a mauve to a red, giving the whole cell a rather dirty color. These cells were called amphophiles. This group is the basis of the accompanying tables.

Another group which seems to depend somewhat upon the time of staining consists of those cells wherein the whole cell including granules, nucleus and cytoplasm take on a bluish tint. These were called basophiles, and are not regarded as significant in our problem, because apparently due to technique.

A third group consists of those cells which seem to have been

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\**Jour. Amer. Med. Assoc.*, May 8th, 1912.



overstained with the red element; and here too the cause seems to lie in the technique.

In order to record this grouping, the polymorphonuclears are grouped into the immature, the ripe and the degenerate. The immatures include the large granular cells with large single nuclei. The ripe forms have been subdivided again into the amphophiles, the neutrophiles, oxyphiles and basophiles. (In this grouping the neutrophiles represent the standard or conventional staining reaction for normal cells.) The degenerates include the basket cells and such others as are too brokendown for their origin to be determined. The mononuclears were classified into the large, small and immature. This classification is perhaps best illustrated by the accompanying cut of the blank used to record these examinations (Table 1).\*

TABLE 1.—FORM FOR TABULATING REACTIONS.

Hemoglobin .....	Red cells.....	White cells.....
Mononuclears .....	Polymorphonuclears ..	
Large .....	Immature .....	
Small .....	Degenerate .....	
Immature .....	Ripe .....	{ Amphophiles ..... Neutrophiles ..... Oxyphiles ..... Basophiles .....
	Eosin .....	
	Mast .....	

The accompanying tables show the percentage of amphophiles in the various diseases and in relation to the total white-cell count. The diagnosis is stated in terms as general as possible in order to include all the possible influences on the blood condition. The first three tables show the result of grouping the records by the total leucocyte count. The first group consists of those under 10,000, the second those between 10,000 and 20,000, and the third those above 20,000.

In the study of the 186 cases where the total count was under 10,000 we find the largest group, that with intestinal stasis, so great that abdominal pains were complained of. In this syndrome the

\*In the January issue of the *Archives of Internal Medicine*, Dr. Frank A. Evans reports a case wherein the transitionals were greatly increased. His description of the cells and the colored plate accompanying the article lead me to believe that the tinctorial reaction is the same as that I am trying to describe. He would, however, confine it to the transitionals and large mononuclears.

As I have pointed out before (*Interstate Med. Jour.*, Vol. XX, No. 11) the confusion in the nomenclature of hematology has rendered interpretative work difficult. I have followed Pappenheim, rather than Ehrlich and Nægeli, in considering the transitional merely a juvenile or irritation form of the polymorphonuclear system (or better of the granular system). Therefore, many of the transitionals in my smears have been reckoned among the mature polymorphonuclears, the 'immature' grouping being reserved for the granular cells with large round nuclei.

amphophilic cells seem particularly numerous, so that 23 of the 35 cases have 20 per cent., or above, of amphophilic cells. When now we add to this the cases wherein some sluggishness of the bowel was the chief factor, we find colitis 6, enteroptosis 13, pericolitis 10, pyloric stenosis 2. That is, in a total of 66 cases of sluggish bowel action, there were 40 wherein this abnormal susceptibility to stains was shown. To put the matter in another way, when the total leucocyte count is not raised, the cases of intestinal absorption show an increase in the susceptibility to the stain.

Take every other group of cases and we find that the relation between the amphophilic cells and the neutrophiles is very different. For example, the pyelitis group—wherein one would expect the colon bacillus to be the chief offender—of the 7 cases 5 were from 4 to 20 per cent. amphophilic and only 2 above 20 per cent. Even the cases of acute gastro-enteritis, of which there are 8, show a different relation—2 being normal and 6 on the border-line.

There is, however, a group of cases wherein the total number is so small that conclusions cannot be definitely drawn, but which show a decided tendency to amphophilia. These are septicemia (malignant endocarditis), general adenopathy, cholelithiasis, pernicious anemia and empyema. As might be inferred from the low blood count these patients showed low resistance, or at least low reaction, to the disease and might be classed among the very seriously sick. They have in common a toxemia in the broad sense of the word.

In the group of cases numbering 159 wherein the leucocyte count ran from 10,000 to 20,000 we find the largest of the known groups again to be constipation. Here again the bulk (11 out of 15) of the cases are amphophilic. Similarly, we can add the allied groups—intestinal stasis with Graves' disease (1), intestinal stasis with amenorrhea (1), colitis (8)—and still not change the proportions. When, however, we look at the acute conditions, such as appendicitis and gastroenteritis, we note that little amphophilia exists and the conventional neutrophilia prevails. This calls attention to the fact that there is difference in staining reaction when the body reacts sharply as shown by the increased white count.

The mental cases—chiefly of the intoxication variety—and the pelvic abscesses also show an increased susceptibility to the stains. A plausible explanation would be that they, too, represent disease forms in which the body has taken up much 'poison.'

Duodenal ulcer is represented by 13 cases. It is interesting in showing some amphophilic tendencies—not as pronounced, however, as in the cases of colonic stasis. We might infer that in duodenal ulcer there are two possible tendencies,—the one toward inflammatory reaction and the other toward the absorption of toxins.

Another interesting group is that of pregnancy. The increased white cell count would point to the body's reaction against the

toxemia of pregnancy, while the amphophilia would point to the absorption of substances that influence the blood cells.

In the third group of cases—that is, where the total count is above 20,000—we find the acute diseases in greater evidence. Therefore, we find the amphophilia less pronounced. The severe cases, such as the empyema, the cancer, and the leukemia carry the strongly amphophilic cells. Pregnancy again shows a moderate degree of amphophilia; so also colonic stasis (Lane's bands).

Now taking up the percentage of cases in which the amphophilia was 20 per cent. or above, we find that in the last group (20,000 and above) the percentage is 12.5, in the intermediate group 36.2, and in the normal count just under 41.4 per cent. This would bear out our assumption that the amphophilia is in inverse ratio to the cell count—that it increases as the reactivity or resistance of the body decreases—in those cases wherein there is an absorption of toxic material.

TABLE 2.—NORMAL WHITE CELL COUNT—TO 10000.

	0—3%	4—20%	20+%	Totals
Tuberculosis .....	1	1	2*	4
Gastroenteritis .....	2	6		8
Neurasthenia .....	5	9		14
Syphilis .....	1	1	1	3
Unknown .....	11	5	8	24
Hysteria .....	1		5	6
Lime deficiency.....	1	2		3
Cancer .....	1	2	2	5
Colitis .....		6		6
Enteroptosis .....		8	5	13
Intestinal stasis with pain..		12	23	35
Pregnancy .....		1	1	2
Migraine .....		1		1
Mental .....		6		6
Typhoid .....		3	2	5
Prostatitis .....		1		1
Thymus .....		1		1
Malaria .....		1		1
Uterine tumor.....		1	2	3
Pyelitis, etc.....		5	2	7
Endometritis .....		1		1
Pelvic abscess.....		1		1
Neurosis .....		1		1
Arteriosclerosis .....		2		2
Epilepsy .....		1	1	2
Dysentery .....		2	1	3
Hypernephroma .....		1		1
Arthritis Chronic.....		1	2	3
Pleurisy .....		2		2
Asthma .....		1		1
Eczema .....		1		1
Pericolitis .....			10	10
Septicemia .....			1	1
Nephritis .....			1	1
Adenopathy (general).....			1	1
Cholelithiasis .....			3	3
Pyloric stenosis.....			2	2
Pernicious anemia.....			1	1
Empyema .....			1	1
	23	86	77	186



It is interesting now to look at the group of cases in which no record was made of the cell count. The total number of records was 30. We find the severe amphophilia registered under diverticulitis (with complete obstruction), colitis (chronic), pericolic adhesions, pericarditis (chronic), tuberculosis, migraine, bronchiectasis, colonic stasis, diabetes and neurasthenia. This certainly checks well with the other groups, for the chief offenders are cases of bowel stasis, and the next group the toxemias.

The conclusion is that the so-called amphophilic reaction to the Mai-Gruenwald-Giemsa stain is independent of technique and dependent on changes in the blood.

TABLE 3.—WHITE CELL COUNT FROM 10000 TO 20000.

	0—3%	4—20%	20+%	Totals
Unknown .....	7	8	4	19
Prostatic abscess.....	2		2	4
Mental disturbance.....			6	6
Pelvic abscess.....			1	1
Adenopathy .....			1	1
Hodgkins .....			1	1
Gastroenteritis .....			1	1
Neurasthenia .....	5		1	6
Duod. ulcer.....	1	6	6	13
Cancer .....	1		2	3
Endocarditis .....		1	2	3
Intestinal stasis+Graves' disease .....		4	4	8
Intestinal stasis+Amenorrhea .....			1	1
Intestinal stasis.....	2	2	11	15
Colitis .....			8	8
Renal colic.....			1	1
Sternal fist. (tubercular?)..			1	1
Abortion .....			1	1
Pregnancy .....	2	3	3	8
Migraine .....		1		1
Asthma .....	3	4		7
Urethritis .....		5		5
Arteriosclerosis .....		1		1
Pneumonia .....	2	1		3
Cervicitis .....		1		1
Tuberculosis .....	3	6		9
Tumors .....		2		2
Tabes .....		2		2
Otitis .....		2		2
Dipsomania .....	1	1		2
Boils .....		3		3
Neuroses .....		4		4
Chorea .....	1			1
Overwork .....	1			1
Appendicitis acute.....	2			2
Appendicitis chronic.....	3			3
Fibrosis pulmon.....	1			1
Septicemia .....	2			2
Vagotonia .....	2			2
Pyloric stenosis.....	2			2
Hypernephroma .....	1			1
Beriberi (recurrent).....	1			1
	45	57	57	159

TABLE 4.—WHITE CELL COUNT ABOVE 20000.

	0—3%	4—20%	20% & up	Totals
Pneumonia (Empyema).....			1	1
Cancer .....		1	1*	2
Leukemia .....			1	1
Gallstones .....	2			2
Appendicitis .....	4			4
Measles .....	1			1
Tuberculosis .....	1			1
Pneumonia .....	2	1		3
Gastroenteritis .....	1			1
Diabetes .....	1			1
Cancer of lung.....	1			1
Pregnancy .....		1		1
Lane's bands.....		2		2
Pancreatitis .....		1		1
Abscess in leg.....		1		1
Angina .....		1		1
	13	8	3	24

TABLE 5.—RECORDS OTHERWISE SUFFICIENT WHERE NO WHITE CELL COUNT WAS GIVEN.

	0—3%	4—20%	—20% & up	Totals
Syphilis .....		1		1
Epilepsy .....		1		1
Neurasthenia .....		1	1	2
Diabetes .....		1	1*	2
Stasis (colonic).....		2	1	3
Thyroiditis .....		1		1
Rickets .....		1		1
Pyelitis .....		1		1
Unknown .....	2	3		5
Bronchiectasis .....			1	1
Migraine .....			1	1
Tuberculosis .....			1*	1
Pericarditis (Graves' dis.)...			1	1
Pericolic adhesions.....			1	1
Colitis .....			1	1
Diverticulitis .....			1*	1
Enteroptosis .....	3			3
Duodenal ulcer.....	1			1
Epistaxis .....	1			1
Appendicitis .....	1			1
*Fatal outcome.....	8	12	10	30

The increased susceptibility to the stain seems particularly pronounced in those conditions wherein the blood-stream has taken up foreign material.

This foreign material may be of the type found either in the pregnancies or in colonic stasis.

The increased susceptibility to the stain seems also indicative of lowered bodily resistance.

## A NEW METHOD OF TREATING TUBERCULOUS AND OTHER CHRONIC INFECTED SINUSES. A PRELIMINARY REPORT.

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By W. O. SWEET, M. D., of Phoenix, Ariz.

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Before proceeding with any new method of treatment two important factors must always be considered:—

1. What harm can be done to a patient.
2. What good can be accomplished.

In reporting this method, I wish to emphasize that these experiments have been carried out with these two factors in mind.

In order to determine to what extent the human organism might be injured, it was necessary to carry out preliminary experiments on living animals. This factor was determined by work upon dogs, rabbits and guinea-pigs, the details of which will be given in a later article.

The second factor—namely, what good can be accomplished, is determined by observing the effect of the treatment on the pathological conditions present in the patients. In the treatment of tuberculous sinuses, the object desired is to eradicate, if possible, all infected tissue and then heal, as rapidly as possible, the area embraced by the destructive process. If the sinus has been allowed to remain open and discharging for a great length of time, we have three pathological conditions to deal with:—

1. The excessive and irregular formation of the connective-tissue.
2. The tuberculous infection.
3. A low grade mixed infection.

In attacking the problem of evolving a treatment for this type of wound, we turn naturally to germicides in some form. Tuberculous and other forms of chronic infected sinuses have been receptacles for almost everything in the Pharmacopeia. It is quite useless to enumerate in this paper the various methods and their results, as we have all tried them and seen them fail. When we introduce a germicide in the form of a liquid or a semi-solid into such a sinus, we kill the micro-organisms in the loose pus contained in the sinus cavity. At the same time, we destroy all budding capillaries and other newly formed tissues with which nature is attempting to repair the damage done by the organisms at work there.

With these facts in mind, a new substance with a maximum germicidal power for plant cells and a minimal germicidal power



for animal cells was sought. Up to the present, our experience with germicides has shown us that substances which kill the pathogenic micro-organism are, at least, just as destructive to the cell of the complex organism. It becomes necessary, then, to place within these sinuses a substance which, as soon as it has completed their sterilization (as far as this is possible), will not remain to continue its destructive action upon the tissue cells.

Obviously, the only form in which a germicide can be used to accomplish both these ends is the *gaseous form*.

The most easily produced and most accessible gas is formaldehyde, but this gas cannot be used with success in the treatment of tuberculous sinuses owing to its destructive action to tissue cells. A 1:1,000 solution, according to Bastedo, is necessary to kill colon bacilli, and the time given is twenty-four hours. Other gases tried have presented similar or worse defects, making them impracticable.

The gas used in our new methods is that produced by ionizing organic matter. It has been found that air passed through an electric arc has very slight germicidal power. Exposure of bacteria to this for forty minutes does not perceptibly inhibit their growth. On the other hand, if the air is passed through crude spirits of rosin before being subjected to the arc, it is germicidal to all bacteria in a vegetating stage in twenty minutes or less, most of them dying in from twelve to fifteen minutes; this refers to the gas direct from the arc. If the gas is pumped from the arc into a ten gallon glass retainer and out again, its bactericidal effect is markedly increased, requiring only three to five minutes to kill vegetating micro-organisms. There is a marked difference in these gases. The gas direct from the arc is a non-irritant and has not an unpleasant odor. After being passed through the retainer, it has a slightly irritating effect on the mucous membrane of the nose and bronchi, but does not irritate a wound to any perceptible extent. I have applied it to fresh cuts on myself and my assistant, and to one cut where a finger had been torn off in a threshing machine accident, with no disagreeable sensations; only a slight tingling, which disappears upon removal of the gas, is noticed.

In the past year and a half, while working with dogs and other animals, we have treated all our own scratches, bites, etc., and have never become infected, although constantly handling virulent emulsions of staphylococci, streptococci, tubercle bacilli, etc. In the case of the threshing machine accident mentioned, the amputated finger was filled with dirt and dust. The man refused to have it amputated further and have the skin flap closed over the wound, as I advised. The patient was informed of the danger from tetanus and other infection, but refused to have any other treatment than dressing. He was treated on his own responsibility for one hour with the aged gas. The wound was dressed by completely excluding dirt, etc.,

with a rubber dam and bandages. Three days later the dressing was removed and no pus or other evidence of infection was found. He was given five additional treatments at three-day intervals. During this time granulation tissue covered the end of the bone, and the skin closed over the end of the finger. After the sixteenth day no further treatment or dressing was required. I did not notice any retardation of granulation or epidermization. This case is cited merely to show the effect on fresh wounds, and to illustrate that the gas has very little, if any, destructive action on normal tissue. If there is any destructive action, it is very slight and does not noticeably retard the healing of a fresh wound. This point, however, will not be decided until further observations have been made. It is certain that no macroscopic changes occur, and, so far, no microscopic changes have been observed that would suggest a detrimental effect on wound healing.

A typical experiment to determine if any retarding effect on wound healing is present, is the following: Wounds were made on dogs' heads by cutting through all structures and marking the bone. Equal numbers were treated and kept as controls. No pus formed in the treated wounds, and very little induration occurred around the wound edges. The untreated dogs became infected and extensive induration was present around their wounds. The dogs were treated by the gas direct from the arc thirty minutes each day for twelve days. At the end of this period, the gaping wounds had closed, the scalp was not adherent to the structures below, and only slight crusts remained to show the sites of the wounds. The untreated dogs, on the sixteenth day, showed marked indurations, adherent scalps, with very heavy crusts which had only formed solid in the last two days.

Wounds made on dogs' legs where they could be licked were left untreated and after sixteen days were still unhealed. No bandages or dressings were applied to any of these wounds, and no other treatment was used.

Numerous similar experiments have been carried out on animals for a period of one year with uniform results, excepting the slight variations which occur in all animal work.

CASE I.—Referred by Dr. John Wix Thomas. Boy, *æ*t. twelve. *Family History*.—Father died with tuberculosis; otherwise negative.

*Past History*.—About two and one-half years ago complained of severe pains in knee. Was taken to a doctor who treated him for rheumatism. He grew rapidly worse and pain in hip soon eclipsed that in knee; the doctor informed the parents that he was "driving it up." The parents called Dr. John Wix Thomas who made a correct diagnosis of tuberculosis of the hip and advised extension with rest in bed. This was refused by the parents and the case was lost sight of for several months. When next seen by Dr. Thomas, patient had three discharging sinuses and an ankylosed hip, the thigh being flexed at an angle of about 45°. These discharging sinuses failed to close up to the time the case was referred to me.

Physical examination showed fairly well-developed and well-nourished boy. Head: poorly kept teeth; tonsils normal; head otherwise negative. Chest negative. Heart sounds normal. Abdomen negative except slight tenderness to the right of the umbilicus. Right leg normal and well developed. Left leg undeveloped, much smaller, with a completely ankylosed hip, upon which are found three scars and two discharging sinuses. One scar at a point  $1\frac{1}{2}$  in. below ischial tuberosity was purple and slightly tender to pressure. The two remaining scars were white and apparently completely healed. The large sinus was located about the center of Poupart's ligament; the skin surface around the sinus opening showed extensive involvement, measuring  $1\frac{1}{2}$  in. by  $\frac{3}{4}$  in. and presenting the typical apple-jelly appearance of tuberculosis. A probe could easily be passed downward and backward to the bone for a distance of about 4 inches. The discharge from the sinus was very profuse, saturating eight thicknesses of cotton flannel in twelve hours. The sinus below the great trochanter extended upward and inward for about  $3\frac{1}{2}$  in. The roentgenogram showed the bone involvement. Cultures taken from these sinuses showed very heavy growth on surface of media.

The treatment was started August 16th, 1915, a combination of fresh and aged gases being used. After the first three treatments the discharge had changed from pus to serum; after the tenth treatment, the discharge was perceptibly less from the larger sinus and its character had changed from pus to serum with discharge sufficient only to penetrate three thicknesses of cloth in twenty-four hours. The lower sinus had closed with a crust over the opening; the skin around the upper sinus had cleared and contracted down to the sinus opening proper, which only permitted the entrance of a 3 mm. glass tube. At this time, cultures taken from the sinus before treatment at a depth of 2 in. gave a heavy growth, while cultures taken after five minutes' treatment with the aged product showed no growth. In view of this fact, short treatment of five to fifteen minutes of the aged gas and ten to twenty minutes' fresh gas were used throughout remaining period of treatment.

After the twenty-second day, the purple scar below the ischial tuberosity opened up, and gas put in under pressure would cause pus to discharge from this reopened sinus. This fresh opening was treated three times, when it closed and remained closed while patient was under observation. This incident showed the positive connection with the upper sinus, making a through and through channel. The sinus beneath the great trochanter did not resume the marked discharge, but did not completely heal. The upper sinus became drier with a gradual decrease in the discharge of serum; it never assumed its original appearance of yellow and greenish pus. The zone of hyperemia never returned, the skin remaining apparently normal around the sinus opening, which had reduced in size from  $1\frac{1}{2}$  to 3 in. to an opening not more than  $\frac{1}{2}$  in.

Sixty-five treatments were given over a period of three months. The improvement was marked, and the patient at no time grew worse or showed any ill-effects from the treatment.

CASE II.—Referred by Dr. Garland B. Couch. Mexican baby, *æ*t. eighteen months.

*Family History.*—Mother and father apparently healthy, but two other members of the family living in same house have tuberculosis.

Dr. Couch was called to see the case and found markedly enlarged lymph glands on right side of neck. These had been gradually enlarging, as nearly as the history could be obtained, for about three months. The glands involved were the anterior group. The swelling, at this time, was about the size of a hen's egg and fluctuated on palpation. Parents refused to allow the gland to be opened, in spite of the temperature and apparent illness of the child.



From this time, for a period of three weeks, the mass inside the neck enlarged about 100 per cent. I was called in consultation and advised incision and drainage, which was again refused. Eight days later, Dr. Couch was called and made slight incision through the skin,  $\frac{3}{4}$  in. long. About 5 oz. of white pus was discharged. The patient was kept under observation for about twelve days and no tendency to heal was noted. The margins of the wound extended and assumed an apple-jelly appearance, but not very marked. The patient was sent to me for treatment at this time. The patient was treated ten minutes each day. At the beginning of the treatment a bulging of tissue was noticeable, when gas was applied under pressure, showing a large cavity the size of an egg. On the third day the skin cleared, and the surface closed on the fifth day; this was reopened and a considerable amount of sero-sanguineous exudate was allowed to escape. On the sixth day the discharge showed less than any previous day and was composed of serum only. This gradually decreased each day and ceased on the twelfth day. On the fourteenth day the sinus closed and has remained closed three and a half months; child gained weight and is apparently healthy.

CASE III.—Referred by Dr. John Wix Thomas. I. M., male, *æt.* thirty.

"Came to Arizona in November, 1912, with active pulmonary tuberculosis, running a temperature of 102 and 103° F. each day. He received treatment for about two years, at the end of which time the pulmonary disease was entirely arrested, but he developed a tuberculous epididymitis, for which an operation was performed March 28th, 1915. The operation was followed by a sinus which continued to discharge until he was referred to Dr. Sweet for treatment on June 17th, 1915. Under this treatment, the sinus healed very promptly and has remained so to this date, with patient in apparently normal condition." (Dr. Thomas.)

This case was a sinus extending from a point  $1\frac{1}{2}$  in. below the upper margin of the scrotum, upward and outward along Poupart's ligament to a point over the internal inguinal ring, where a mass about the size of an almond could be clearly outlined. A reddened area 2 cm. wide was easily noticeable on the skin over this place; patient complained of tenderness, and on palpation it was very painful. He could walk, but was unable to do his regular work. Pus was discharging freely from sinus. Upon introducing the gas under pressure, a distinct bulging was observed throughout the length of the sinus, and over the mass at the upper end.

This patient was given far more radical treatment than any of the previously mentioned cases, getting twenty minutes' aged gas, and forty minutes' fresh gas (direct from the arc), for the first five days. After each treatment the wound was sterile and no culture could be grown, although before treatment a heavy growth developed in twenty-four hours on the surface of the media. On the sixth day the character of discharge changed from pus to a brownish serum. For the following five days, forty minutes' gas direct from the arc was administered and found sufficient to prevent the development of any colonies on media. At the end of this period all soreness had disappeared, the mass reduced one-half in size, and patient had gained 4 lb. in weight. At the end of twelve days, the gas could not be forced to upper end of sinus; at the end of fourteen days no bandage was necessary, discharge had stopped and no further treatment was given. This case, as stated in Dr. Thomas's report, has remained healed up to date.

CASE IV.—Miss W., nurse. August 4th patient noticed itching sensation in index finger of the right hand, between first and second joints; had been dressing pus case a few days before. Four days after noticing the sensation, which was superficial, she called the doctor's attention to it. He injected local anesthesia through the infected area and made an incision down to the periosteum

and curetted the bone. Three hours after this procedure patient's finger began to swell rapidly and hyperemia extended over both palm and dorsum. Patient suffered severe pain for two days and was seen by me on the third day after the operation. When I saw the case it presented the appearance of a diffuse cellulitis involving both the flexor and extensor tendons of the index finger. Patient was put to bed and hypodermics of morphine given at intervals to quiet pain and produce sleep. Hot applications were used for three days, and the discharge from the incision slightly increased. Patient was given nitrous oxide and two incisions made, one through the palmar fascia and one on the dorsum back of the metatarso-phalangeal joint. Pus discharged freely from these openings. Four weeks after the last incision, radiographs were taken which showed the bone involvement very plainly. Pus continued to discharge profusely until October 8th, on which date ionized gases were used. After three days of five minutes' treatment each day, there was less hyperemia and swelling. Pain and soreness markedly decreased and there was no pus after the 16th. No further treatments were given; hand healed, leaving a stiff finger which can be neither flexed nor extended. The case was not tuberculous, but is cited as a difficult infection involving the bone and tendons.

CASE V.—J. S., miner. Referred by Dr. John Wix Thomas. "Had an accidental injury to the hand and wrist, involving fracture of three metacarpal bones. Was operated June 7th, 1915, the metacarpals sutured with silver wire. This was followed by a sinus which continued to discharge quite freely and was referred to Dr. Sweek, whose treatment markedly decreased the amount of discharge, though it continued to recur, and the offending wires were removed on October 29th, 1915." (Dr. Thomas.)

This case is reported to illustrate the futility of attempting to heal up a sinus in which a foreign body is the exciting cause, until that foreign body is removed. This case could be completely sterilized and closed, but after a few days would open again.

CASE VI.—Mrs. C. W., *æt.* twenty-seven. Referred by Dr. John Wix Thomas. "Reported July 30th, 1915, with history of never having been sick since childhood, except for frequent attacks of tonsillitis. Glands of the neck had been enlarged since childhood, the enlarged glands being removed four years ago and others last April. One sinus still freely open, being about 1 in. by  $\frac{1}{2}$  in. wide and  $\frac{3}{4}$  in. in depth. Referred to Dr. Sweek for treatment of sinus, which promptly began to heal. The patient was called East before treatment was completed." (Dr. Thomas.)

The above report of Dr. Thomas is a good summary of this case. The details are as follow: When gas under pressure was introduced into the sinus and the cavity completely filled, it was found to extend further up the neck along the posterior border of the sterno-cleido-mastoid muscle for a distance of about  $2\frac{1}{2}$  in. This channel was very tortuous and could not be measured accurately with a probe. Patient received fifty treatments, administered daily. When patient went East, the sinus was one-fourth the original size, and discharged no pus and very little serum. The gas could not be forced upward in the deep channel.

Patient has since been heard from, and is completely well, with no evidence remaining except healthy scar.

At the present time 8 cases of various types of tuberculous sinuses are under treatment, but none has been treated a sufficient length of time to permit report. These cases with further experimental work will be given in a final report.

## CONCLUSIONS.

1. Air passed through rectified spirits of rosin and subjected to the action of an electric arc of sufficiently high voltage will produce a germicidal gas.

2. If this gas is passed through a ten-gallon glass container which fills and empties in one-half minute, its germicidal power is markedly increased.

3. The product fresh from the arc has no irritating properties.

4. If allowed to age, the gas becomes slightly irritant when inhaled.

5. The time necessary for germicidal action to be complete is twenty minutes for the fresh product and three to five minutes for the aged product.

6. Wound healing is not retarded to any perceptible extent.

7. Infected wounds heal more quickly than with any other known germicide.



## THE EBERHART—A NEW UNIT OF MEASUREMENT FOR AUTOCONDENSATION.

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By NOBLE M. EBERHART, M. D., Ph. D., D. C. L., of Chicago.

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For a long time autocondensation has been measured solely by means of a hot wire meter showing what may be termed equivalent ampèrage. This method of measuring current on the basis of ampèrage alone is quite as unsatisfactory as it would be if our electric current measured in our meter was taken on the basis of the number of ampères without considering the voltage. In other words, just as in measuring our consumption of electricity the unit is based on the product of the voltage and the ampèrage, so the autocondensation output should be considered in terms representing a product of the voltage and ampèrage.

In measuring the electric current one volt times one ampère is one watt, and one thousand watts or a kilowatt is the basis upon which you are billed for your electric current consumption. Therefore, in autocondensation if we took a unit which corresponded to the watt, that is, multiplied the voltage by the ampèrage, we would have a unit resting on similar grounds; but since the voltage in the average machine would be from 25,000 to 50,000 volts and the ampèrage runs from 300 to 1,500, the product would represent figures of such large dimensions that it would be difficult to make practical use of them. Therefore, I have produced a unit of measurement which is based on the passage of 1,000 volts to each 100 milliampères of meter reading. Thus if the machine has a voltage of 50,000, there would be 50 of these units passing to each 100 milliampères of meter reading, and if the meter showed 300 milliampères of current, then there would be 3 times 50 or 150 of these units passing during each minute of time that the patient was under treatment.

This method of measuring autocondensation on the basis of its effectiveness reconciles the controversy which has long existed between manufacturers of different types of apparatus. For instance, we have two distinct types on the market, one having a voltage of about 50,000 and capable of showing an ampèrage reading of 300 to 500 and which can seldom be pushed as high as 700; the other, a machine with a voltage of 25,000 and an ampèrage operated easily at 800 to 1,200, and which may be increased to 1,500.

In type No. 1 the machine is most easily operated at about 350 or 400, and in type No. 2 with the same ease 700 or 800 milliampères are obtained. It will be seen at a glance that on the basis of the

autocondensation effectiveness being a product of volts times am-pères, that one machine has twice the voltage and half the ampèrage of the other, and that the product in either case would be the same, that is, 50,000 volts at 400 is the same as 25,000 volts at 800. Therefore, the treatment value to the patient of 10 or 15 minutes would be the same in either case.

Going back to our unit for autocondensation which I call the Eberhart, one machine is delivering 50 of these units to each 100 meter reading, and the other is delivering 25 units per 100 of meter reading, but the second machine operates naturally and easily at twice the meter reading of the first machine. Therefore, in either case the number of Eberharts per minute would be 200 if the respective meter readings were 400 and 800. Now, an average dose of autocondensation is 2,500 of these units, from which it will readily be calculated that if 200 are delivered per minute, it would take  $12\frac{1}{2}$  minutes to deliver a dose of 2,500 E. In other words, it is merely necessary for the manufacturer in giving his directions for autocondensation, to say: "This machine delivers 25 or 50," or whatever the number of Eberharts may be, "per each 100 of meter reading." It will then be easy for the operator to calculate the number of minutes required to give a definite dosage, it being understood in these cases that the machine is to be operated at an ampèrage which is maintained without undue crowding, which as stated above, would be 350 to 400 on the high voltage type machine, and 700 to 900 on the low voltage apparatus, at the same time making a unit based on 1,000 volts and 100 milliampères, which brings the figures controlling the unit down within a comprehensible range.

25 East Washington Street.

## SPECIAL ARTICLE.

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### 'LITTLE CLASSICS' PHYSICIANS MAY HAVE OVERLOOKED.

[The following story should be of great interest to all physicians, for no matter how heroic they may be in the operating room after attending many operations, their debut there must have had some points of similarity to the incident described by Conan Doyle. It is well in its way to say that never was one affected in like manner; and it is well in its way to say that the odor of chloroform when experienced for the first time was not at all objectionable. But in saying this, the tried and experienced physician forgets the sensations he had when seeing 'his first operation,' or is not at all keen to recall his defeat. Conan Doyle, having been a physician of note before he turned novelist, knows whereof he speaks; and what with his intimate knowledge of human nature and a literary style that is direct and completely divorced from the non-essentials, he has evolved a true and faithful picture of an amusing occurrence in the operating room that could be drawn only by one who is both physician and novelist.—Literary Editor.]

#### HIS FIRST OPERATION.\*

It was the first day of the winter session, and the third year's man was walking with the first year's man. Twelve o'clock was just booming out from the Tron Church.

"Let me see," said the third year's man. "You have never seen an operation?"

"Never."

"Then this way, please. This is Rutherford's historic bar. A glass of sherry, please, for this gentleman. You are rather sensitive, are you not?"

"My nerves are not very strong, I am afraid."

"Hum! Another glass of sherry for this gentleman. We are going to an operation now, you know."

The novice squared his shoulders and made a gallant attempt to look unconcerned.

"Nothing very bad—eh?"

"Well, yes—pretty bad."

"An——an amputation?"

"No; it's a bigger affair than that."

"I think—I think they must be expecting me at home."

"There's no sense in funking. If you don't go to-day, you must to-morrow. Better get it over at once. Feel pretty fit?"

"Oh, yes; all right!" The smile was not a success.

"One more glass of sherry, then. Now come on or we shall be late. I want you to be well in front."

"Surely that is not necessary."

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\*Taken from "Round the Red Lamp," by A. Conan Doyle. D. Appleton and Co. 1902.



"Oh, it is far better! What a drove of students! There are plenty of new men among them. You can tell them easily enough, can't you? If they were going down to be operated upon themselves, they could not look whiter."

"I don't think I should look as white."

"Well, I was just the same myself. But the feeling soon wears off. You see a fellow with a face like plaster, and before the week is out he is eating his lunch in the dissecting rooms. I'll tell you all about the case when we get to the theatre."

The students were pouring down the sloping street which led to the infirmary—each with his little sheaf of note-books in his hand. There were pale, frightened lads, fresh from the high schools, and callous old chronics, whose generation had passed on and left them. They swept in an unbroken, tumultuous stream from the university gate to the hospital. The figures and gait of the men were young, but there was little youth in most of their faces. Some looked as if they ate too little—a few as if they drank too much. Tall and short, tweed-coated and black, round-shouldered, bespectacled, and slim, they crowded with clatter of feet and rattle of sticks through the hospital gate. Now and again they thickened into two lines, as the carriage of a surgeon of the staff rolled over the cobblestones between.

"There's going to be a crowd at Archer's," whispered the senior man with suppressed excitement. "It is grand to see him at work. I've seen him jab all round the aorta until it made me jumpy to watch him. This way, and mind the whitewash."

They passed under an archway and down a long, stone-flagged corridor, with drab-coloured doors on either side, each marked with a number. Some of them were ajar, and the novice glanced into them with tingling nerves. He was reassured to catch a glimpse of cheery fires, lines of white-counterpaned beds, and a profusion of coloured texts upon the wall. The corridor opened upon a small hall, with a fringe of poorly clad people seated all round upon benches. A young man, with a pair of scissors stuck like a flower in his buttonhole and a note-book in his hand, was passing from one to the other, whispering and writing.

"Anything good?" asked the third year's man.

"You should have been here yesterday," said the out-patient clerk, glancing up. "We had a regular field day. A popliteal aneurism, a Colles' fracture, a spina bifida, a tropical abscess, and an elephantiasis. How's that for a single haul?"

"I'm sorry I missed it. But they'll come again, I suppose. What's up with the old gentleman?"

A broken workman was sitting in the shadow, rocking himself slowly to and fro, and groaning. A woman beside him was trying

to console him, patting his shoulder with a hand which was spotted over with curious little white blisters.

"It's a fine carbuncle," said the clerk, with the air of a connoisseur who describes his orchids to one who can appreciate them. "It's on his back and the passage is draughty, so we must not look at it, must we, daddy? Pemphigus," he added carelessly, pointing to the woman's disfigured hands. "Would you care to stop and take out a metacarpal?"

"No, thank you. We are due at Archer's. Come on!" and they rejoined the throng which was hurrying to the theatre of the famous surgeon.

The tiers of horseshoe benches rising from the floor to the ceiling were already packed, and the novice as he entered saw vague curving lines of faces in front of him, and heard the deep buzz of a hundred voices, and sounds of laughter from somewhere up above him. His companion spied an opening on the second bench, and they both squeezed into it.

"This is grand!" the senior man whispered. "You'll have a rare view of it all."

Only a single row of heads intervened between them and the operating table. It was of unpainted deal, plain, strong, and scrupulously clean. A sheet of brown water-proofing covered half of it, and beneath stood a large tin tray full of sawdust. On the further side, in front of the window, there was a board which was strewn with glittering instruments—forceps, tenacula, saws, cannulas, and trocars. A line of knives, with long, thin, delicate blades, lay at one side. Two young men lounged in front of this, one threading needles, the other doing something to a brass coffee-pot-like thing which hissed out puffs of steam.

"That's Peterson," whispered the senior, "the big, bald man in the front row. He's the skin-grafting man, you know. And that's Anthony Browne, who took a larynx out successfully last winter. And there's Murphy, the pathologist, and Stoddart, the eye-man. You'll come to know them all soon."

"Who are the two men at the table?"

"Nobody—dressers. One has charge of the instruments and the other of the puffing Billy. It's Lister's antiseptic spray, you know, and Archer's one of the carbolic-acid men. Hayes is the leader of the cleanliness-and-cold-water school, and they all hate each other like poison."

A flutter of interest passed through the closely packed benches as a woman in petticoat and bodice was led in by two nurses. A red woolen shawl was draped over her head and round her neck. The face which looked out from it was that of a woman in the prime of her years, but drawn with suffering, and of a peculiar beeswax tint. Her head drooped as she walked, and one of the nurses, with

her arm round her waist, was whispering consolation in her ear. She gave a quick side-glance at the instrument table as she passed, but the nurses turned her away from it.

"What ails her?" asked the novice.

"Cancer of the parotid. It's the devil of a case; extends right away back behind the carotids. There's hardly a man but Archer would dare to follow it. Ah, here he is himself!"

As he spoke, a small, brisk, iron-grey man came striding into the room, rubbing his hands together as he walked. He had a clean-shaven face, of the naval officer type, with large bright eyes, and a firm, straight mouth. Behind him came his big house-surgeon, with his gleaming *pince-nez*, and a trail of dressers, who grouped themselves into the corners of the room.

"Gentlemen," cried the surgeon in a voice as hard and brisk as his manner, "we have here an interesting case of tumor of the parotid, originally cartilaginous but now assuming malignant characteristics, and therefore requiring excision. On to the table, nurse! Thank you! Chloroform, clerk! Thank you! You can take the shawl off, nurse."

The woman lay back upon the water-proofed pillow, and her murderous tumour lay revealed. In itself it was a pretty thing—ivory white, with a mesh of blue veins, and curving gently from jaw to chest. But the lean, yellow face and the stringy throat were in horrible contrast with the plumpness and sleekness of this monstrous growth. The surgeon placed a hand on each side of it and pressed it slowly backwards and forwards.

"Adherent at one place, gentlemen," he cried. "The growth involves the carotids and jugulars, and passes behind the ramus of the jaw, whither we must be prepared to follow it. It is impossible to say how deep our dissection may carry us. Carbolic tray. Thank you! Dressings of carbolic gauze, if you please! Push the chloroform, Mr. Johnson. Have the small saw ready in case it is necessary to remove the jaw."

The patient was moaning gently under the towel which had been placed over her face. She tried to raise her arms and to draw up her knees, but two dressers restrained her. The heavy air was full of the penetrating smells of carbolic acid and of chloroform. A muffled cry came from under the towel, and then a snatch of a song, sung in a high, quavering, monotonous voice:

"He says, says he,

If you fly with me

You'll be mistress of the ice-cream van.

You'll be mistress of the——"

It mumbled off into a drone and stopped. The surgeon came across, still rubbing his hands, and spoke to an elderly man in front of the novice.



"Narrow squeak for the Government," he said.

"Oh, ten is enough."

"They won't have ten long. They'd do better to resign before they are driven to it."

"Oh, I should fight it out."

"What's the use. They can't get past the committee even if they get a vote in the House. I was talking to——"

"Patient's ready, sir," said the dresser.

"Talking to McDonald—but I'll tell you about it presently." He walked back to the patient, who was breathing in long heavy gasps. "I propose," said he, passing his hand over the tumor in an almost caressing fashion, "to make a free incision over the posterior border, and to take another forward at right angles to the lower end of it. Might I trouble you for a medium knife, Mr. Johnson?"

The novice, with eyes which were dilating with horror, saw the surgeon pick up the long gleaming knife, dip it into a tin basin, and balance it in his fingers as an artist might his brush. Then he saw him pinch up the skin above the tumor with his left hand. At the sight his nerves, which had already been tried once or twice that day, gave way utterly. His head swam round, and he felt that in another instant he might faint. He dared not look at the patient. He dug his thumbs into his ears lest some scream should come to haunt him, and he fixed his eyes rigidly upon the wooden ledge in front of him. One glance, one cry, would, he knew, break down the shred of self-possession which he still retained. He tried to think of cricket, of green fields and rippling water, of his sisters at home—of anything rather than of what was going on so near him.

And yet somehow, even with his ears stopped up, sounds seemed to penetrate to him and to carry their own tale. He heard, or thought that he heard, the long hissing of the carbolic engine. Then he was conscious of some movement among the dressers. Were there groans, too, breaking in upon him, and some other sound, some fluid sound, which was more dreadfully suggestive still? His mind would keep building up every step of the operation, and fancy made it more ghastly than fact could have been. His nerves tingled and quivered. Minute by minute the giddiness grew more marked, the numb, sickly feeling at his heart more distressing. And then, suddenly, with a groan, his head pitching forward, and his brow cracking sharply upon the narrow wooden shelf in front of him, he lay in a dead faint.

When he came to himself, he was lying in the empty theatre, with his collar and shirt undone. The third year's man was dabbing a wet sponge over his face, and a couple of grinning dressers were looking on.

"All right," cried the novice, sitting up and rubbing his eyes. "I'm sorry to have made an ass of myself."

"Well, so I should think," said his companion. "What on earth did you faint about?"

"I couldn't help it. It was that operation."

"What operation?"

"Why, that cancer."

There was a pause, and then the three students burst out laughing. "Why, you juggins!" cried the senior man, "there never was an operation at all! They found the patient didn't stand the chloroform well, and so the whole thing was off. Archer has been giving us one of his racy lectures, and you fainted just in the middle of his favourite story."

# MEDICAL AND SURGICAL PROGRESS.

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## THE STAMMER-SCHOOL.

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By LOUIS K. GUGGENHEIM, M. D., of the Editorial Staff.

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1. Bluemel: Stammering and Cognate Defects of Speech. 1913. G. E. Stechert and Co.
2. Appelt: Stammering and Its Cure. 1911.
3. Scripture: Stuttering and Lipping. The Macmillan Co.
4. Gutzmann: Sprachheilkunde. 1912. Fischer.
5. Stekel: Nervøse Angst-zustände. 1912. Urban and Schwarzenberg.
6. Fröschels: Sprachheilkunde. 1913. Verlag von Deuticke.
7. Reed: A Clinical Study of Stammering. (*Lancet-Clinic*, Vol. CXIV, No. 16.)
8. Appelt: Progress in the Treatment of Stuttering. (From *Heilen und Bilden*. 1914, Verlag von Reinhardt.)
9. Swift: A Psychological Analysis of Stuttering. (*Jour. Abn. Psych.*, Vol. X, No. 4.)

For years and years stammer-schools have flourished throughout Europe and America. Their methods are all practically the same; each one, however, claiming a secret, 'sure-cure' which each pupil must promise not to divulge. A very elaborate written guarantee is usually exchanged for coin of the realm; but a 'come-back' has always proved ineffectual. The parent who is naive enough to ask for a return of his money because his child has not been helped, is told that the child would not carry out certain exercises properly, therefore the failure.

Most stammer-schools are conducted by cured stutterers who, having overcome their own defect through exertion of will, feel within themselves the power to heal the world. Method? Oh, any old method will do as the temporary improvement accomplished in all such schools can be gained with anything which suggests improvement to the sufferer! The usual system is (a) silence for a few days; (b) exercises in rhythm; (c) speaking one word with a breath, then two, then three, etc. All pupils are treated in classes. Improvement is often noted immediately and consists of a decrease in the inhibition of speech and an enormous increase in self-confidence. This is the psychological moment for testimonials and the charlatan has no difficulty in getting brilliant ones which are stored away for future use. After a few weeks or months of treatment the stutterer goes his way rejoicing. "Hel-lo-Mo-ther, hel-lo-Fa-ther! You-see-I-am-cured," he proclaims with great enthusiasm upon his return home. Nobody notices the



hidden hand pathetically beating time. After a few days or a few weeks he forgets upon one occasion to beat time; there is a horrifying recurrence of the stuttering and a sudden collapse of self-confidence: the cure is over. In other cases a sudden emotional strain brings with it the recurrence. The stutterer does not say: "So the stammer-school is mere fakery; I wasn't cured at all"; on the contrary, he is convinced that the method is splendid, the trouble lay in his not attending long enough; so back he goes for another try. Of course the same experience is repeated, and finally the stutterer is thoroughly discouraged and sure that there exists no help for him. And still the stammer-schools flourish and will continue to flourish until the medical profession sees fit to consider this interesting psychoneurosis a medical problem.

It is an astonishing fact that not until very recently has the medical profession been interested in speech defects and even now there are in the entire civilized world only a few men who have fitted themselves for work in this field. To the writer's knowledge there are but three speech clinics in the United States. The extent of the problem will be realized when the reader is told that in the public schools of Saint Louis there are 2500 reported cases of speech disturbance.

Of all speech defects stuttering is the most important. Shall we physicians, the guardians of the physical and mental health of our fellow-citizens, continue to tolerate the stammer-school, or shall we take unto ourselves this step-child of medicine, this problem of speech disturbance and try to understand it?

Let us for a moment consider the true nature of stuttering, and then judge of stammer-school methods. First of all one must know that a small percentage of stutterers recover without any particular treatment: this explains the few permanent cures reported by stammer-schools. The vast majority of stutterers neither overcome their defect alone nor with stammer-school treatment. Why then do we meet so few adult stutterers? The answer is a simple one. In the course of years stutterers become very skillful in their ability to hide their defect. When blocked they use some other word, or hum and haw until the compulsion has subsided. By means of these tricks the speech defect is concealed, but the stutterer suffers quite as much as when his defect was clearly manifest, because his psychic disturbance remains the same. An example of this condition is a physician whom the writer knows. When he wishes to give simple directions such as "Take a dose of oil before retiring," he expresses himself in the following manner: "Now-a-you-know-a-it wouldn't be a bad thing to-a-help nature along a little by-a-taking something-a-in the way of-well let me see-a-have you any favorite medicine that you take-a-for the purpose? No; well then suppose you-a-take a little-a-a-oil to-night before you retire." The impression made upon the patient is that the physician is very deliberate in what he is doing; no suspicion arising that the unfortunate physician is having a fearful struggle with himself in order to say the simple words necessary to express his thoughts. The physician in question is an extremely busy man and has an awful time of it getting through his day's work. With a little experience one can see through this veneer of normality. Several years ago, a public-school teacher in Berlin, Germany, consulted a logopedist. Her condition was as follows: Many years before she had been a

manifest stutterer. Through exertion of will she had overcome the speech defect and had become a teacher. Her intrapsychic conflicts, however, had continued as forceful as ever, and consequently her life was almost intolerable. She lived in constant dread of a recurrence and of losing her position. Her manner of expression while very deliberate and involved was entirely free of manifest stuttering. These 2 cases explain the apparent disappearance of stuttering in adult life.

What is stuttering? First of all it is not stammering; the latter condition being a defect of speech characterized by the inability to pronounce certain sounds correctly. Stuttering is speech blocking. The inhibition of speech is the direct result of a desire not to speak. But the stutterer insists that he desires above everything to speak; so he does consciously, but unconsciously he is afraid of divulging certain secrets through speech.

The unconscious, our historical department of psychology, contains many, many things which we would prefer not to publish. Among other things are infantile tendencies of different kinds; 'awful things' which in the adult amount to perversions. Now in the normal adult this infantile material has been completely repressed and remains repressed; in the neurotic it is only partially repressed, struggling constantly for expression. This incompletely repressed material is the motive power for speech inhibition.

To cure stuttering it is necessary, in the majority of cases, to make conscious the individual's entire historical psychology. This we accomplish through the interpretation of dreams, through reaction tests, etc. etc. A complete analysis of a case of stuttering requires from six months to a year. After the individual's unconscious material has been made conscious he ceases to fear divulging through speech his 'fearful' secrets. This is not all, however; every stutterer must be re-educated in regard to his attitude toward society. In most cases he has shunned society through fear of being embarrassed, etc. We pay but little attention to the actual speech defect in the course of treatment. The inhibition of speech becomes less forceful as the fear of divulging unconscious material decreases. In early life stuttering can, in some cases, be cured by means of simple suggestion without analysis. Unfortunately one must add that cases are met with which are neither amenable to analysis nor to suggestion because of lack of education and intelligence. Such cases are, of course, hopeless.

Let us contrast this rational therapy with stammer-school methods. The stammer-school teacher perceives nothing but the peripheral manifestations of stuttering, *e. g.*, defective breathing and articulation, harshness and monotony of voice, accessory movements, etc. His every effort is directed toward a cure of these symptoms, the cause of the disturbance remaining untouched.

Stammer-schools will continue to flourish until physicians become more interested in speech problems.



## DIAGNOSTIC AND THERAPEUTIC NOTES.

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THE SILVER TREATMENT OF MENINGITIS.—Wolf (*Deutsch. med. Wochenschr.*, 1915, No. 50). The analogy with gonorrhea led the author to try protargol in the treatment of epidemic cerebrospinal meningitis. He reports 5 cases (all adults) so treated, all ending in recovery. By means of lumbar puncture, the spinal fluid was withdrawn until it dripped slowly. Five c.cm. of a 0.5 per cent. solution of tropacocaine was then injected (novocaine appeared less effectual), and ten minutes later 10 c.cm. of a sterile 0.2 per cent. solution of protargol. With proper technique, the injections of protargol are painless. If, however, the spinal anesthesia is imperfect, violent ascending pains, lasting five or ten minutes, may result. In any event, no permanent ill effects seem to follow the injection, which in some cases must be repeated a number of times.

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TRANSFUSION WITH THE PATIENT'S OWN BLOOD.—Lichtenstein (*Muench. med. Wochenschr.*, 1915, No. 47). In cases of extra-uterine pregnancy or ruptured uterus, the author opens the abdomen, and while proceeding with the operation has the extravasated blood dipped out of the abdominal cavity and mixed with a moderate amount of Ringer's fluid. The mixture is beaten with small wooden rods until it is thoroughly defibrinated. It is then filtered through sterile gauze, and again mixed with a somewhat greater quantity of Ringer's solution. The resulting fluid is kept at body temperature, on a water bath, until the operation has been completed; it is then slowly injected intravenously. The entire procedure must, of course, be conducted with the most rigid asepsis. It was successfully used in 7 cases of extra-uterine pregnancy and in one case of fresh uterine rupture. All the patients recovered with unusual rapidity.

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A SIMPLE TREATMENT FOR IVY POISONING.—Lane (*Medical Record*, September 11th, 1915). The affected areas are loosely covered with two or three thicknesses of gauze or cheesecloth, which is kept continually moist with a solution of boric acid, the strength of which is unimportant. The gauze is frequently changed in any case, but the frequency depends somewhat upon whether there is much oozing from the blebs. The larger blebs are opened, but it is unnecessary to touch the smaller ones. If the gauze is used more than once it is rinsed and boiled before it is reapplied. As the larger number of these cases occur during the hot weather it usually adds to the comfort of the patient to keep a small piece of ice in the solution so that it may be applied cold. This is usually the whole treatment, but in cases where the itching is very intense some additional relief may be obtained by gently sponging with a weak solution of alcohol when the gauze is changed. A simple ointment may be used for protection after healing has begun and the skin has become fairly smooth.



**COPIOUS ALBUMINURIA A SIGN OF MENINGEAL HEMORRHAGE.**—Guillain (*Presse Méd.*, November 8th, 1915). Many cases of meningeal hemorrhage are characterized by the appearance of great quantities of albumin in the urine. The amount of albumin varies from 0.2 to 2 per cent. The albuminuria begins soon after the hemorrhage, reaches its maximum twenty-four to forty-eight hours later and rapidly disappears, so that a few days later only a trace of albumin or none can be found. There is no polyuria and the sediment contains no casts. This, together with the course of the albuminuria, enables one to use the latter in the differential diagnosis between meningeal hemorrhage and uremia, cerebral embolism or thrombosis and bulbar disease. It is useful, however, only when positive. Some cases of meningeal hemorrhage are unaccompanied by this massive albuminuria, so that a negative finding has no diagnostic value.

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**DIAGNOSIS OF TUBERCULOUS MENINGITIS.**—Moody (*Lancet*, January 1st, 1916). It is far more difficult to make a diagnosis of tuberculous meningitis in adults than in children, so that any new sign is to be welcomed. The writer believes that he has found such a sign in a retention of the urine, coming on without apparent cause, and while the patient is fully conscious. There is no desire to void and no feeling of fullness of the bladder. The sign was present in 4 cases of tuberculous meningitis recently observed in male adults, and the writer believes it to be of definite diagnostic value.

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**OPEN AIR TREATMENT OF PNEUMONIA AND ANEMIA IN CHILDREN.**—Freeman (*Amer. Jour. Med. Sciences*, January, 1916). At the Roosevelt Hospital all children with pneumonia are kept out of doors. They are given a dose of castor-oil, and put in beds on the roof. Their extremities are kept warm, and their bowels open. Sometimes, if the cough is troublesome, a little tincture of chloride of iron is given. Otherwise, practically no drugs are used. Under these conditions, the pneumonias seem to run a short course and to have a very low mortality. Remarkable results were also obtained by this treatment in cases of anemia and leucocythemia. The results show that the out-of-door treatment of children, even in winter, increases their vitality and resistance to disease more powerfully than medicines.

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**THE INTRAVENOUS USE OF EMETINE IN PURPURA HEMORRHAGICA.**—Cole and Quereus (*New Orleans Med. and Surg. Jour.*, 1916). In a case of hemorrhagic purpura, the usual procedures, including intramuscular injections of emetine, were without effect. Emetine was thereupon administered intravenously, half a grain in the usual solution being injected into the basilic vein. There being no reaction, the injection was repeated six hours later. On the succeeding four days, the injection was given twice daily, with rapid disappearance of all symptoms.

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## EDITORIAL.

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### 'BLACK LOOKS' AND THE SURGEON.

In a clever essay in a recent issue of the *Spectator* (London) one may read some wise lines and imbibe some excellent lessons on the subject of black looks. No doubt you have observed these looks at times in your supposedly sympathetic friends and have always remarked them in your enemies. You may have put the query to yourself, Why am I greeted thus when I am all amiability and kindness? In the beginning your mind activates mildly for an explanation, and this not being forthcoming, launches itself into deep and varied thinking on the subject. But though you cogitate over the matter with an intensity that should bear fruit of the right sort, you continue to be without an answer. Where does the fault lie? Surely not with you, for have you not said that you are amiable and kind almost to breaking point? And yet you are to blame, for you may, on account of your success in life, be a bit supercilious; you may on account of your ambitions be impatient of those who have no ambitions; and you may be a specialist in literature, in art, in medicine, and hence feel that on account of concentrating your mind on one phase of human progress you are an adept who should win immediate recognition. No one in his right mind would accuse you of serious intentions to offend, and yet no one in his right mind would accuse you of not knowing your full worth. To hide your feelings so completely that self-assertion and self-knowledge are obliterated, would be asking something that is impossible; and while there have been a few cases on record where a genius has been thoroughly unconscious of his gifts, there is no record that even such extraordinary modesty has been rewarded by other than

black looks. Hence it can be seen at once that black looks are the order of the day, and that when you are amiable and kind with the natural leaven of some knowledge of what you really know and really amount to, or are excessively modest and too shy to be self-assertive, you are going to be met with them. Envy or pity is always the exciting cause; and are we going too far when we assert that to-day in medicine the general practitioner and the surgeon exchange black looks altogether too often?

The surgeon, it may be said here, does certain things which the general practitioner does not like, and the general practitioner does certain things which the surgeon does not like. The surgeon feels that as a diagnostician in certain cases his word should be law, and the general practitioner is a little miffed when his diagnosis, pitted against the surgeon's, has not the latter's directness and surety but wobbles a bit, due to the fact that his view is more comprehensive, hence more insecure. The general practitioner is a patient worker; he observes; he watches; he waits. The surgeon, on the other hand, rarely waits, not because he wants to operate at once, but because he is impatient of the many details which obsess the general practitioner's mind in making a diagnosis. The surgeon enters the case in the sense of an invited guest who is bidden, because of his reputation, to add intelligence to an affair that lacks mental ballast on account of conflicting opinions. He knows that the family wants him, or that the general practitioner has sent for him, for one purpose only,—that is to assume the responsibility of the case. Of course, he is going to preen his feathers; he would not be human if he did otherwise. But just because he is firm and somewhat enamored of his own importance and, perhaps, where the general practitioner has failed altogether to recognize the surgical aspect of the case, a bit arrogant, there is no reason to cast black looks at him. Let us suppose he were not to take himself quite so seriously as is his wont to-day, and that instead of making a quick and 'penetrating' diagnosis, he were 'to play around the family,' as is the habit of the general practitioner. Let us suppose that before he gives his opinion he were to ask about Willie's cough and Josephine's indigestion, and whether the *paterfamilias* is working as hard as he did last year, and institute the closest inquiry as to Aunt Mary's condition, because Aunt Mary, one of these days, is going to bequeath her whole fortune to the family. Would the general practitioner respect him, or would the family honor his opinion? On the contrary, he would be thought a kindly man and one who has the family's interests at heart, but not the sort of guest to



have who by the light of his reason is going to bring order out of chaos.

We hold no brief for the surgeon and we hold no brief for the general practitioner. We know the shortcomings of each, and we know that despite dignity and education and that much abused and misinterpreted word, civilization, little jealousies will crop up even in those walks of life where boast is made that such a thing is impossible. The general practitioner needs the surgeon and the surgeon needs the general practitioner. If the surgeon would recognize a little more how helpful in some cases the diagnosis of the general practitioner is to him, he would not be thought the bull in the china shop which some medical men think him to-day; he would not align himself in the general practitioner's mind with Mr. Cutler Walpole in Bernard Shaw's "The Doctor's Dilemma," who says: "Oh, by the way, Ridgeon, that reminds me. I've been talking to that poor girl. It's her husband; and she thinks it's a case of consumption: the usual wrong diagnosis: these damned general practitioners ought never to be allowed to touch a patient except under the orders of a consultant. She's been describing his symptoms to me; and the case is as plain as a pikestaff: bad blood-poisoning. Now she's poor. She can't afford to have him operated on. Well, you send him to me: I'll do it for nothing." P. S.

#### A PROTEST.

[In the March issue of the JOURNAL there appeared an editorial entitled "The Girl Who Would Die Thin," which was written by the Literary Editor over the initials "P. S." The editorial was founded on a poem by Mary Aldis, which appeared in a recent issue of the *Little Review* (Chicago), and which had for its title, "Ellie; The Tragic Tale of An Obese Girl." The intention of "P. S." when he wrote the editorial was to write a *jeu d'esprit* with an underlying stratum of truth so as to show how futile is an obesity cure of doubtful reputation ("Caldwell's Great Obesity Cure" is mentioned in the poem), and how futile have been the efforts of medical propagandists to prejudice people against patent medicines. This was his intention; and if he failed it was due to the fact that he overestimated his powers as a writer and especially was guilty of not knowing that his sense of humor was greatly at fault. That his intention was scathingly to criticize Mrs. Aldis was far removed from his ratiocination; and though he does not fully agree with the poetess that all the imagination was monopolized by him (see paragraphs 4 and 5 of the letter), he most willingly publishes the subjoined protest.—LITERARY EDITOR.]

CHICAGO, ILL., March 18th, 1916.

EDITOR, INTERSTATE MEDICAL JOURNAL,  
St. Louis, Mo.

*My Dear Sir:*—In your issue of this month there is an article signed "P. S.", entitled "The Girl Who Would Die Thin." The subject of the article is a poem of mine recently published in the *Little Review* of Chicago. On this text, "P. S." hangs a variety of accusations directed against the medical profession and myself.

On first reading, I thought the article intended for a joke, so very extraordinary were the deductions, but the tone of the succeeding notice on a Life of Marie Tarnowska, convinced me "P. S." was actually serious.

He quotes the story I have told in "Ellie" as if he were quoting from testimony sworn to in a court of justice,—“Mrs. Aldis had a manicurist.”—“Mrs. Aldis went to the funeral,” he states, gravely and categorically. After outlining the story, he adds caustic remarks as to my callousness and general inadequacy in allowing so tragic an event as the death of a young girl from taking an “obesity cure.”

May I take occasion to tell “P. S.” one or two things he has neglected to take into consideration in his article?

First, there never was any “Ellie”; I never had any fat manicurist; I never knew anybody who took an obesity cure. I don’t know anything about the proper methods to take to get thin. I never went to the funeral of any manicurist. I never journeyed to any seashore town for the purpose of going to any funeral.

I suppose it may be admitted that there is one prime requisite for anyone who writes, and that is imagination. This might be said to be true even for writers in medical journals. Will “P. S.” try and use a little?

I wished to make a story; I chose for my theme, the old one of a beauty-loving soul encased in an ugly body. To make it more dramatic, I represented “Ellie” as beautiful in death. That is all. There is not a word of truth in the story.

Will you kindly give space in your April issue for this letter? Since I am charged by “P. S.” with a “coldness that is most reprehensible,” I should like to make the above explanation. I am,

Yours truly,

(Signed) MARY ALDIS.

MRS. ARTHUR ALDIS,  
190 E. Chestnut St.

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### SPECIALISTS AND CONSULTANTS.

It has been frequently suggested that physicians and surgeons should altogether cease to be in separate camps. Some one has prophesied that the practitioner of the future will be a kind of sectional sub-committee, that he will be a man who understands all about a disease or a limited group of diseases—which is the popular conception of a specialist now; so that the same man will be both physician and surgeon for his special organ. Thus a man who is a specialist for the stomach will be both physician and surgeon for the stomach. This is quite rational. There are, of course, some ailments which require no surgeon. But in eye, ear, and throat work it is already the rule for the physician to be the surgeon; and the physician who specialised on the eye and could not use the knife would be at a disadvantage in competing with the surgeon who could. The public has a direct way of thinking that the man who opens the stomach ought to know what should be put into it. People demand prescriptions from the surgeon, and, I might add, they get them.—From “The Doctor and the People” by H. De Carle Woodcock.

## ORIGINAL ARTICLES.

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### CESAREAN SECTION BY THE MODIFIED DAVIS OPERATION.

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By JOHN T. WILLIAMS, M. D., F. A. C. S., of Boston,  
Fellow in Gynecology, Harvard University; Third Assistant Visiting Surgeon  
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Gynecological Department, Boston Dispensary.

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The modern era in cesarean section may be said to date from two epoch-making papers. The first of these was published by Asa B. Davis,<sup>1</sup> of New York, in 1905, describing the improved technique which has been adopted with little modification by nearly all American obstetricians. The second of these important contributions to obstetric literature was made by Edward Reynolds,<sup>2</sup> of Boston, who, in 1908, showed that, by careful study of the patients in advance of labor and proper selection of cases, cesarean section could be made an operation without mortality, as in a series of 30 cases operated upon by himself. All writings previous to these are of historical interest only, and should not influence our consideration of the operation as done under present-day conditions and by the improved technique.

Briefly described, the essential points of the Davis operation are as follows: A short median incision is made entirely above the umbilicus. The uterus is not delivered, but the abdominal cavity is protected by gauze pads, and the uterus opened *in situ*. The membranes are ruptured, a foot is seized and the fetus extracted by a manœuvre similar to the Smellie-Veit method for extraction of a breech. As the child is delivered, the first assistant grasps each end of the uterine wound with volsellum forceps and quickly draws the uterus up into the abdominal incision to prevent escape of blood and liquor into the peritoneal cavity. The cord is cut and clamped either by a second assistant, the nurse, or the operator himself, and the baby turned over to another assistant for resuscitation, if necessary. The placenta and membranes are removed and the uterus closed by two tiers of sutures. The gauze pads are then removed and the abdominal wall closed in layers.

The advantages claimed for this operation are as follows: the high incision avoids adhesions between the uterus and the abdominal



wall because the fundus uteri after delivery sinks below the lower end of the abdominal incision. The upper portion of the abdominal wall is stronger than the lower and less subjected to strain; therefore hernia is less likely to occur. Opening the uterus *in situ*, instead of first delivering it outside the abdomen, reduces shock, greatly simplifies the operation, and because of the shorter incisions left to sew up, decreases the time necessary to perform the operation.



Fig. 1.

With regard to the advantages of the high incision, it is fair to say that adhesions between the uterus and parietal peritoneum seldom give any trouble, while the high incision subjects a more movable organ, the stomach, to possible adhesions, which would be far more serious than uteroperitoneal adhesions. Furthermore, during



Fig. 2.

the operation the stomach often presents in the wound and increases the operator's difficulties. After a brief experience with the high incision, the writer has gone back to Davis' original operation, in which the incision is made with its centre rather than its lower end at the umbilicus, but which is in all other respects identical with

the technique described above. Since adopting his present technique, the writer has performed, during the past two years, seventeen consecutive cesarean sections without a maternal death.

The operation is extremely simple, the average time consumed

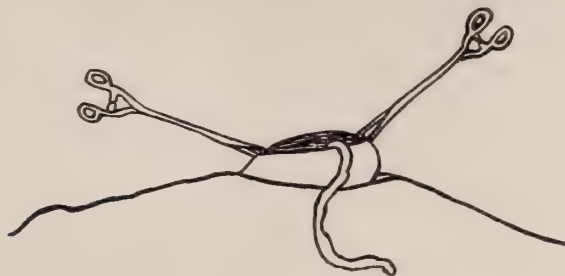


Fig. 3.

being twenty to twenty-five minutes, the fastest operation taking eighteen, and the slowest forty minutes. A few particular points in technique may be found of value. The abdominal incision is usually 4 to 5 in. in length. The peritoneum is protected by a single

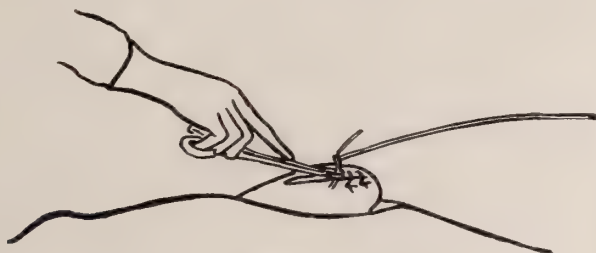


Fig. 4.

long strip, dry in order better to absorb liquor. The uterine wall is cut through with the knife and the incision extended by the two index fingers. A previous mapping out of the fetal position allows the operator to seize the anterior foot without loss of time. The



Fig. 5.

sole duty of the first assistant as the child is delivered is to seize the uterus with volsellum forceps and bring it up into the abdominal wound so that liquor and blood will not escape into the peritoneal cavity. Clamping and cutting the cord should be done by a second

assistant, nurse, or the operator himself. In removing the secundines, care must be taken that a small piece of membrane is not left occluding the internal os. The writer has once seen this happen (not in a case operated upon by himself), and the uterus afterward filled up with blood. Fortunately the difficulty was recognized and the membrane punctured through the cervix with relief of the condition.

In suturing the uterus, a row of deep catgut sutures through the muscular layer is placed first, taking care to insert the sutures near together and to include the entire thickness of the uterine wall except the mucosa. The uterine peritoneum is then closed over these stitches by a continuous suture of catgut. The abdominal wall is closed in layers. One c.cm. of sterile ergot and  $\frac{1}{2}$  c.cm. of pituitary extract are given hypodermically as the incision through the abdominal wall is being made.

The indications in the 17 cases were as follow:—

Contracted pelvis .....	10
Primiparous breech .....	2
Eclampsia and contracted pelvis.....	2
Inertia uteri and previous stillbirth.....	1
Oversized baby in normal pelvis, rupture of membranes before labor..	1
Puerperal psychosis, contracted pelvis.....	1
	17

Eleven cases were done before the onset of labor, six during labor. One patient was operated upon twice and on one other the writer did the second cesarean, but not the first. All the mothers recovered. The babies were all born alive and all did well with two exceptions. One of these was delivered of one of the eclamptics and was premature. It did well for over two weeks, but died after leaving the hospital. The other exception was the baby born of the case of puerperal psychosis. It was somewhat premature, but weighed 5 lb. and seemed in every way vigorous, but on the second day it suddenly became blue and cold and died within a few minutes.

The indications for Cesarean section may be subdivided in the main into the following groups:—

1. Mechanical.

- (a) Contracted pelvis.
- (b) Relative or absolute large size of child.
- (c) High abnormal presentations in the primipara.
- (d) Elderly primipara.
- (e) Dystocia from ventro-fixation.
- (f) Fibroids of the uterus.

2. Eclampsia.

3. Placenta previa.

4. Miscellaneous.



It has been shown by Reynolds<sup>2</sup> that cesarean section done before the onset of labor is a very safe operation, while cesarean section done late in labor, and especially after unsuccessful attempts at delivery, is a very dangerous one. The writer does not agree with Reynolds and others, however, that a few hours of labor increase greatly the risk of cesarean section, provided the patient is kept under close observation and handled with strict asepsis. Therefore, while it is always desirable to operate in advance of labor, there are many border-line cases in which one cannot determine whether the head will pass through the pelvis without the test of labor.

Pelvimetry alone, except in cases of extreme pelvic contraction, will not determine whether cesarean section is necessary. More important than pelvimetry is the relation of the fetal head to the pelvic brim. This is determined by crowding the head downward into the pelvis by the hand on the abdomen, while an examining finger in the vagina notes the amount of descent of the head and the apparent amount of room about it. But even this manœuvre leaves two important factors undetermined—namely, the strength of the uterine contractions, and the flexibility of the fetal skull, and these can be determined only by the test of labor.

The writer's usual procedure is as follows. A multipara with a distinctly contracted pelvis and a history of previous operative delivery with loss of baby is subjected to cesarean section before the onset of labor.

A primipara with a distinctly contracted pelvis, in whom the presenting part has not entered the pelvis one week before the expected date of labor, and in whom the head cannot be forced into the brim by the manœuvre described above, should also have cesarean section performed in advance of labor.

A primipara, with a slightly contracted pelvis, in whom the head has not entered the pelvis one week before the expected date of labor, but where the head can be made by suprapubic pressure to enter the brim, may be allowed to go into labor, but must be considered as a possible candidate for cesarean section. If the uterine contractions are vigorous, the cervix dilates readily, and the presenting part descends into the pelvis, labor may be allowed to continue. On the other hand, if the contractions are irregular, the cervix dilates slowly, and the head remains high after from four to eight hours of labor, spontaneous delivery becomes extremely improbable, and, as the writer has shown elsewhere,<sup>3</sup> cesarean section carries no greater risk for the mother and infinitely less risk for the child than high forceps.

Another class of patients is that of primiparæ, in whom the pelvis is of normal size, but the fetal head remains high up to the end of pregnancy. In some of these, the baby is small and the pelvis roomy,

and there is no question of the outcome of labor. Where the baby is obviously of large size, the patient should be considered as a possible candidate for cesarean section until the head has passed into the pelvis.

High abnormal presentations in the primipara have been previously discussed in this JOURNAL.<sup>4</sup> What was said in that paper concerning the high primiparous breech applies with equal force to the high face and high transverse.

Primiparæ over the age of thirty-five are best delivered by cesarean section because the soft parts become more rigid than in younger patients, often resulting in difficult delivery, deep lacerations, and not infrequently loss of baby. Furthermore, these patients may not become pregnant again, and it is therefore doubly important to safeguard the baby.

A previous ventro-fixation with too firm adhesion of the uterus to the abdominal wall makes it necessary for the enlargement during pregnancy to take place entirely from the posterior wall, resulting in displacement of the os upward and backward, so that the presenting part is forced by the uterine contractions against the firm muscular bar made by the unstretched anterior wall, and there is no sac of forewaters formed to hasten the dilatation of the cervix. Under these conditions spontaneous delivery is impossible, intrapelvic delivery is extremely difficult because of the obstruction formed by the anterior uterine wall and the displacement of the os, and cesarean section furnishes the best means for delivery.

Fibroids of the uterus situated in the lower segment of the uterus may interfere with delivery by actual obstruction to the passage of the child, while those located in the fundus may interfere with contraction of the uterus and in either case furnish an indication for cesarean section.

Eclampsia does not indicate cesarean section as a routine method of delivery because laparotomy decreases the urinary excretion about two-thirds during the twenty-four hours immediately following. The mortality of cesarean section in eclampsia has been given by Peterson<sup>5</sup> as 25 per cent. Cesarean section, however, is indicated in cases of threatened eclampsia during the last month of pregnancy, where the symptoms are increasing rapidly, because of the speed and lack of shock with which the patient can be delivered. Both of the writer's cases were of this class.

Placenta previa will seldom furnish an indication for cesarean section, because the patients are usually too exsanguinated when seen by the obstetrician. Cesarean section would be indicated in a case of central or partial placenta previa in a patient at or near term, in whom bleeding has just begun, and especially in the rare instances of placenta previa in a primipara.

Miscellaneous indications may in individual cases furnish unusual

reasons for cesarean section. One of the writer's patients was delivered by cesarean for puerperal psychosis. The patient was in the last month of pregnancy. She had a justomino pelvis, had had one operative stillbirth, and was to be delivered by cesarean section at term. Toward the end of the seventh month she developed mental disturbance manifested by insomnia, depression and hallucination. These symptoms increased steadily for three weeks. There had been a deep cervical laceration and the cervix was so friable that it did not seem advisable to attempt induction of labor. The patient was delivered by cesarean section, and made a speedy recovery both from the operation and the psychosis.

The after-treatment of cesarean section is that of an obstetric case plus that of a laparotomy. The most common complication is distention, predisposed to by the interference with bowels during pregnancy, followed by the sudden diminution of the intra-abdominal pressure following delivery. The greatest danger after cesarean section comes from thrombosis and embolism. Postpartum hemorrhage is extremely rare.

#### CONCLUSIONS.

With modern technique and under modern conditions, cesarean section has become transformed from a dangerous to a safe operation, from an operation of last resort (which it should never be) to an operation of election.

With careful observation of cases, cesarean section may be looked for to displace entirely high forceps, which is rapidly becoming an unjustifiable operation.

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## ON THE DIAGNOSIS OF FRACTURE BY PHYSICAL EXAMINATION VERSUS SKIAGRAPHY.

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By P. G. SKILLERN, JR., M. D., of Philadelphia.

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Except among those to whom *x*-rays are not available the diagnosis of fracture by history and physical examination alone is rapidly becoming a lost art. The present paper aims to prolong the life of this ancient and honorable method to a mellow old age.

In the diagnosis of fracture by physical examination one of the most distressing spectacles in surgery is to see the examiner going through a series of contortions and gyrations trying to elicit preternatural mobility and crepitus, the patient suffering agonies all the while. This spectacle is too familiar to require description; and that it exists in these days of twilight sleep and painless surgery is quite beyond one's comprehension. Is it to be wondered that people are afraid of physicians? If there be visible deformity what is the use of even *touching* the injured limb?

Medical students and neophytes diagnose fracture (of the forearm, for example) somewhat as follows. The patient comes in offering the injured extremity for examination. The medico immediately pounces upon the forearm with both hands—just as a wild animal upon its prey. Then he begins to take the history, and while this is being recited his hands wander up and down the limb in a purposeless way for from five to ten minutes. After such an ordeal, during which the limb is ruthlessly bent to obtain preternatural mobility and crepitus, the patient is exhausted from the psychic shock of physical pain. I have seen this done so often that I wish to protest against it with all the power at my command. Surgeons have been barbers, but should never be barbarous. The practice of surgery must never be divorced from the *art* of surgery.

The *humane and artful method* of examining for fracture is as follows. The patient is requested to be seated and to review the events which led to the injury. He is then asked if the limb has been fractured or diseased previously. After having visualized the mechanism of the injury from the narrative, the surgeon requests the patient to reveal the sound as well as the injured limb. He then searches for deformity, and if this should be present the physical examination is forthwith terminated. This is an example of masterly inactivity. In the absence of deformity he is justified in running one fingertip moderately firmly along the most superficial portion of the bone until one spot is encountered where the pa-

tient 'winces'—screwing his face up and involuntarily withdrawing the limb: wherever that spot is a fracture exists in 90 per cent. of cases. I prefer the term 'wincing' to 'localized' because it is so much more expressive. True 'wincing' tenderness is almost pathognomonic of fracture—especially when combined with an accurate history of the mechanism of the injury. The patient does seriously object to the momentary pain of 'wincing' tenderness.

Now right here the examiner should stop; he has made his diagnosis and should not shock the patient by further efforts. If he feels that he must elicit preternatural mobility and crepitus let him do so under nitrous oxide gas; the deformity may be reduced at the same time. The surgeon, who reduces a fracture without an anesthetic, in the absence of a contraindication against one, is in my opinion a brute. I am sure that he cannot be deliberate when the patient is conscious, and work without deliberation is not thorough work, and work that is not thorough is liable to lead to the courtroom.

Reduction having been obtained the next steps are to apply a temporary dressing and request a skiagram. The object of a skiagram should be not to reveal a fracture so much as to gauge the completeness of reduction and to show additional fractures which were not suspected and perhaps were masked clinically. It is a great mistake in more than one way to depend exclusively upon a skiagram in the diagnosis of fracture. *A skiagram must be considered merely as one of the many signs of fracture.* He who depends upon the x-rays to diagnose fracture and neglects the history and physical aspects is going to be woefully misled sometime. I need but mention a case where I requested *seven* skiagrams before the fracture—suspected on examination—was revealed graphically. For instance, unless one has seen many skiagrams he can readily overlook in an anteroposterior view a disjunction of the lower epiphysis of the radius, the displacement of which is best afforded by a lateral view. And many fractures which are beautifully reduced in an anteroposterior view are shockingly unreduced in a lateral.

As to the diagnosis of contusion I believe that herein lies one of the biggest fallacies of the day. Contrary to prevailing opinion I consider contusion of bone one of the most difficult of diagnoses to establish, as well as one of the rarest of traumatic bone-lesions. It is difficult because it presupposes that every other possible bone-lesion has been excluded, both by physical examination and by skiagrams, and it is rare because our records show but few contusions of bone during the course of a year, but many fractures. It must be realized that while a vastly greater number of contusions occurs than the physician has to deal with, yet there are but few patients with fractures who do not seek medical advice. In other words, the average patient is not going to the trouble and expense of consulting

his physician for a contusion, but either ignores it or treats it with the historic arnica.

As to the diagnosis of 'sprain,' never having had the opportunity of dissecting a sprain at necropsy I must confess that I do not know what the lesion is, and, not knowing what the living pathology of sprain is, am not sure that the proper treatment of it is clear in my mind. Some say that the ligaments are torn; others, that they are not torn. The most plausible explanation—and one which has been substantiated experimentally and by skiagraphy—is that presented by Ross and Stewart (*Annals of Surgery*, 1912, Vol. LV, 71 and 123)—namely, the doctrine of sprain-fracture or, as I prefer, tear-fracture or fracture *par arrachement*. Here a spicule of cortex corresponding to the insertion of a ligament has been avulsed from the bone. This spicule may be too minute to be revealed by skiagraphy—another example of its unreliability. From clinical study I believe that the puffy wrist-joint which is so commonly spoken of as a 'sprained wrist' is in reality a traumatic synovitis produced by overstretching the synovial layer of the capsule. It does not make much difference about the pathology, for all these cases are best treated by physiologic rest, such as that afforded by a splint.

#### CONCLUSIONS.

1. By obtaining a careful history of the mechanism of the injury and by a brief and gentle physical examination with the elicitation of true 'wincing' tenderness, the diagnosis of fracture can be established in the great majority of cases without the aid of a skiagram.

2. The chief value of a skiagram resides in checking the extent of deformity. A skiagram must be considered merely as one of the many signs of fracture.

3. It is more difficult to diagnose 'contusion' and 'sprain' than to diagnose fracture. Such diagnoses are often but cloaks to cover hasty and incomplete physical examinations, and should presuppose negative results following the exhaustion of every means at one's command to prove the presence of fracture.

241 South Thirteenth Street.



## AN ACCURATE METHOD ON LOCALIZATION OF FOREIGN BODIES IN THE CHEST, AND THEIR REMOVAL.\*

(From the Clinic of the North Chicago Hospital.)

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By EMIL G. BECK, M. D., F. A. C. S., of Chicago,  
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When one suspects a foreign body in the chest, entered either through the bronchus or through the chest wall, he immediately thinks of the radiogram to locate it, because it is the method least harmful to the patient and most dependable for the surgeon.

A radiogram will show the foreign body, provided the object is dense enough to produce a shadow. Bullets, coins, pin-tacks, and metal buttons show distinctly, but glass, aluminum, and wood are not as easily discernible in a radiogram. If the foreign body shows plainly in the radiogram, we are apt to congratulate ourselves for having already localized it, and with the greatest of confidence we decide upon the operation. We believe to have already located the foreign body when we see it in the picture, and all that remains for us to do is to extract it. But, alas! what a disappointment when we cannot find it after searching for an hour or two. This is especially true when it seems so simple; for instance, a needle in the hand, where the field of operation is so small and the needle shows clearly in the picture.

Are not these radiograms deceptive, we exclaim! Does the radiogram deceive, or is it possible that it is our own fault that we cannot find the foreign body? The radiogram does not lie; it obeys certain physical laws. The shadows have been produced by dense bodies, no matter whether we can find these objects or not. The fault is usually our own. We are apt to interpret the shadows incorrectly or we may fail to find the foreign body in the field of operation, often when we have our fingers on it.

Discouraged with some of our failures in locating foreign bodies years ago, I began to search for the cause of these failures and soon discovered that it was the faulty interpretation of the single radiogram which was constantly misleading us.

A shadow produced by a foreign body does not always appear in the same place on a single picture. Its location will depend upon the angle at which the focus of the x-ray tube is placed at the time of exposure, as illustrated in the following experiment.

Fig. 1.—I placed a bullet on the top of a young girl's chest, right

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\*Read before the Western Surgical Association, December, 1915.

in the center of the sternum, and then took two radiograms, without changing the position of the bullet or of the patient, but shifting the tube between the two exposures. On each radiogram the shadow of the bullet will be found in a different place. In one picture it is located on the left side within the lung area; in the other, in the center of the spine. Both interpretations are incorrect, as we know the bullet is on the sternum.

Examine the single plate and we find all the shadows are in one plane, one shadow overlapping the other, so that we have a blurred composition of superimposed shadows, obliterating the outline or contour of the other. Besides, the size of each shadow is enlarged and its density diminished, just in proportion to the distance of the object radiographed from the sensitive plate. Such discrepancies must, of necessity, make interpretation very difficult and lead to many errors.

One can recognize a fracture in the single plate, of course, but he cannot tell the angle of displacement of the fragments. One can see a foreign body in the chest or in the skull, but he cannot tell positively how far it is from the surface, or whether it lies anterior or posterior. This proves the fallacy of trying interpretation of single radiograms with any assurance of a correct anatomical diagnosis.

To overcome this fallacy I have employed almost exclusively during the past eight years stereoscopic radiograms instead of single pictures for locating foreign bodies. My brothers and I have not had a single case in which we did not localize the foreign body since we have employed this method.

As you know, the stereoscopic method consists in taking two pictures of the same body from two different angles, just as the eyes do in inspecting an object. The two radiograms when dry are placed in a stereoscope and a single plastic picture is thus viewed, which gives us not only the height and width of the object radiographed but also its depth. In other words, we get all three dimensions; whereas, in the single plate we only obtain two dimensions, height and width. Here we obtain a plastic picture, in which the distance between different objects is easily estimated and the structures which are radiographed appear more concrete and distinctly outlined.

One obtains an entirely new conception of radiographic work when he has employed the stereoscopic method, especially for locating foreign bodies. It is easier to convey this information by actual illustration than by description, and I present here some of my radiograms reduced to the parlor stereoscope size, and although the detail is lost to a great extent by this reduction, yet enough can be seen to convince you of the great advantages of this method.

I shall cite in detail seven instructive cases in which I employed this method, and I believe that if you get into the habit of using it to

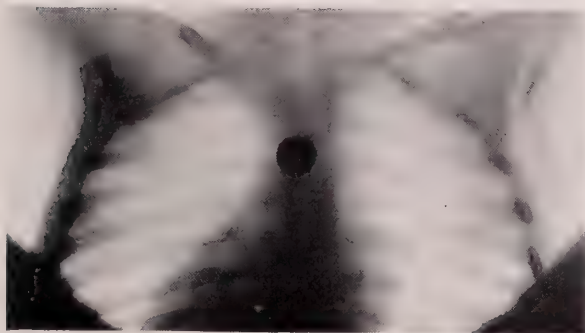
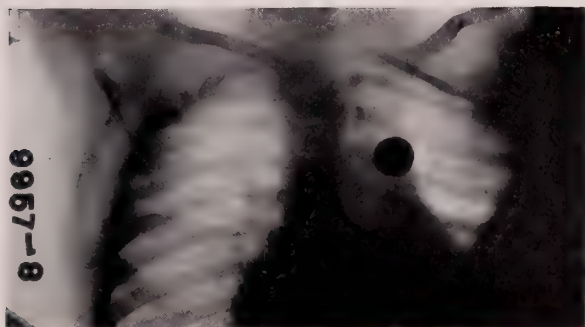


Fig. 1.—Two radiograms of bullet placed on the sternum of patient. Note distortion of its location in shifting tube.

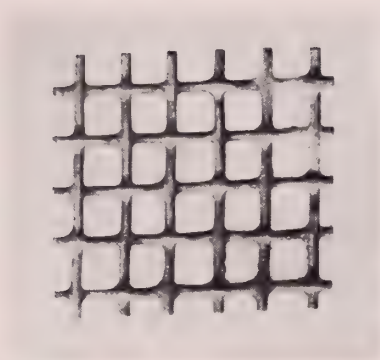


Fig. 2.—Wire screen localizer.

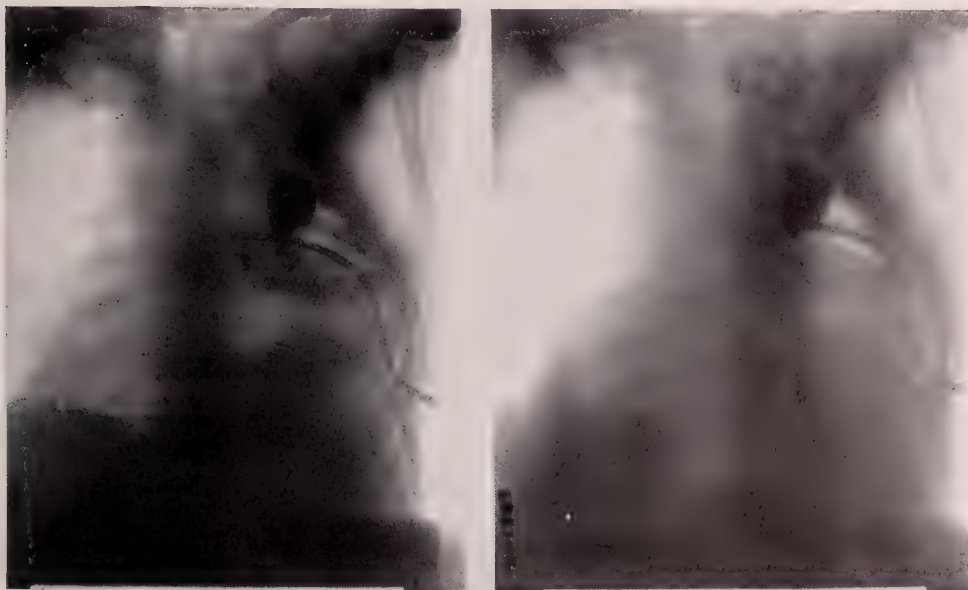


Fig. 3.—Relative distance of pus within the chest, viewed through the stereoscope. View the stereoscopic radiogram and note the relative distances between the catheter, the bismuth, an empty cavity, the ribs, and the screen on the skin.



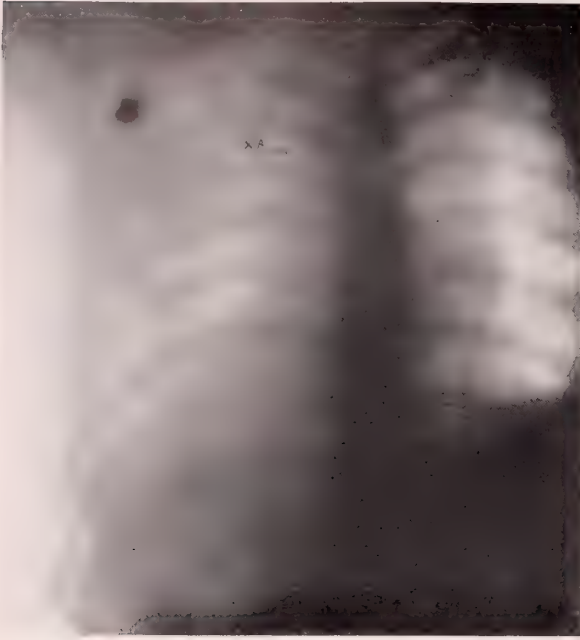


Fig. 4.—Mushroom bullet entered at XA. Localized in stereoscope between posterior ribs and anterior to scapula.

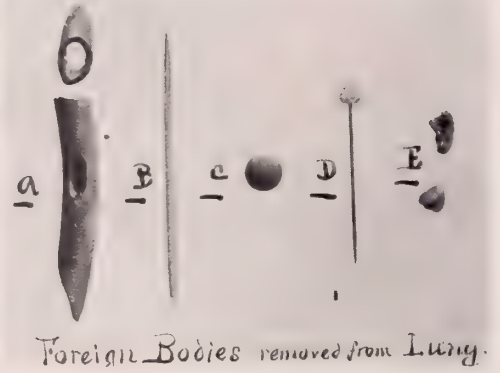


Fig. 5.



Fig. 6.—Bismuth paste injected into chest sinus, after removal of rubber tubing. (Note areas of granulations left from holes in tubing.)

localize foreign bodies you will find it of such advantage to yourself and to your patients that you will adopt it also for diagnostic means in surgery and medicine.

Many suppose that this method of taking radiographs is complicated. This is an error; it is just as simple as taking single pictures. Others hesitate to use it because they believe it is more expensive. Usually it requires two single pictures for an ordinary diagnosis, a lateral and anterior-posterior. Thus the expense is about the same and the two single radiograms will not give nearly as much information as one stereoscopic set.

In order to increase the accuracy and usefulness of localizing foreign bodies, I have devised another adjunct—namely, a small wire screen localizer (Fig. 2) which I place in the region where I suspect the object to be, and fasten it to the skin with adhesive plaster. The shadow of this screen helps to estimate the distance between the skin and the foreign object within the chest. Sometimes I place another small wire screen on the opposite side of the chest, and thus I can easily estimate the relative distance of the object within the chest from both the anterior and posterior surface. Here is an illustration:—

A physician from Oklahoma had an abscess in the lung, draining externally for six years. In order to localize the abscess cavity I introduced a catheter through the sinus opening and after siphoning of about 4 oz. of pus, I injected through the catheter a small amount of bismuth paste and left the catheter in situ. A small wire screen was then placed on the back in the region where the abscess cavity was suspected and a stereo-radiogram was then taken.

Please view the stereoscopic radiogram, Fig. 3, and note the relative distances between the catheter, the bismuth, an empty cavity, the ribs, and the screen on the skin. You should be able to figure out approximately the number of centimeters intervening between the different objects.

Thus, if I should have to drain this abscess, I will know exactly where to make my incision and what ribs to resect. From a single picture alone I do not see how I could tell with certainty whether to make the incision anterior or posterior. In fact, the surgeons who originally drained this abscess made their incision in the axilla, about six inches from the most desirable location for drainage.

I did not have to operate this case at all. Closure of sinus after first injection and a gain of 30 lb. since July, 1915. Allow me to assume that an operation will not be necessary.

The second case illustrates the localization of a bullet and its extraction in a case where the single picture would surely have misled us.

CASE II.—A young woman tried to commit suicide by shooting a 42 caliber bullet through her heart. She was brought to the hospital immediately after the occurrence and there was nothing externally visible except a small bleeding wound between the second and third ribs to the left of the sternum.

A stereoscopic radiogram was immediately taken. The bullet in the single picture appears to be in the axilla (Fig. 4). The stereoscopic radiogram, however, dispels this optical delusion and proves that the bullet has penetrated the chest cavity and landed against the scapula, the impact producing a mushroom bullet.

Thus, we know that the missile is outside the chest cavity, anterior to the scapula. A small incision under cocaine and the chiseling away of an inch of the thin plate of the scapula revealed the bullet, which was extracted. The whole procedure took only ten minutes.

CASE III.—A young lady from Cuba inhaled a pin about 2 in. long some four years ago. The matter was entirely forgotten until during this past year, when she began to expectorate blood. A diagnosis of tuberculosis was made and she was sent to California. Her physician there took a radiogram, which disclosed the presence of a pin in her right lung. He brought her to Chicago to my brother, Dr. Joseph Beck, for extraction of this pin by means of the bronchoscope.

In consultation with two other specialists in this line, we pronounced the case to be unsuitable for bronchoscopic extraction and it was turned over to me for external operation. The stereoscopic picture gives me full information as to the location of the pin and its direction. I was able to remove it by resecting about 2 in. of the tenth rib and had no difficulty whatever in locating the pin as soon as I entered the lung. The procedure was so simplified and the duration of the operation shortened, as we lost no time in locating the pin during the operation. Recovery without complications. Expectoration of blood ceased (Fig. 5D).

CASE IV.—A young Servian was shot some fourteen years ago, and after a dozen buckshots were removed from his body, two remained in his back and caused him much discomfort.

A single radiogram shows the two buckshots, but we are unable to say how deeply they are lodged. With the aid of a stereoscopic set and the use of the wire screen localizer I could ascertain that one was anterior to the eleventh rib, the other in the transverse process of the seventh dorsal vertebra.

The operation proved the correctness of our interpretation of the stereo-roentgenograms. Both buckshots were easily located and extracted (Fig. 5E).

CASE V.—A deaf and dumb boy about fourteen years old was operated two and a half years previously for an abscess in the lung, and after a short period of drainage the wound closed and he was constantly ill and had pain in his chest. I took a single radiogram in this case and noticed that there was a dark shadow on the sixth rib. This shadow coincided with the center of the rib, so that I interpreted it as a tubercular rib.

I decided upon a resection of that rib, and upon incision I found its outer surface entirely clean and healthy, and when I resected the part which was supposed to be involved, I found it absolutely normal. I punctured the pleura and found an abscess underneath this point. Upon evacuating about 4 oz. of dark, thick pus, I found two pieces of rubber tubing within the cavity, which are shown in the photograph (Fig. 5A). These two pieces of rubber tubing have evidently slipped into the abscess cavity subsequent to the first operation, and in spite of this the opening closed with the rubber tubing within the cavity. The single radiogram deceived us. The tubes happened to lie in the same plane of the sixth rib and produced a superimposed shadow, which made



it appear that the sixth rib was diseased. Had I taken a set of stereoscopic radiograms I would very likely have distinguished the two separate bodies, rib and rubber tube. As it were, the two shadows, one caused by the tube and the other by the rib, were superimposed and the blurring of the two shadows produced a picture which one could not interpret unless he knew beforehand that there was a rubber tube in the cavity.

This case then teaches us that the single radiogram in locating foreign bodies is not reliable.

**CASE VI.—*Abscess of Lung Due to Pin-Tack.*** E. D., *æ*t. fifteen. Family history negative as to tuberculosis. Was well until four years ago, when he inhaled a brass pin-tack, the size of a lentil. Within a week he developed pneumonia. After the acute symptoms passed he continued to expectorate pus and had a daily elevation of temperature from one-half to three degrees. In spite of all medical and climatic treatment, the above symptoms persisted for four years.

*Examination.*—I first saw him December 15th, 1908. His weight was 98 lb., temperature 97, pulse 120, cyanotic and greatly distressed. The entire chest was resonant, except the right posterior and lower part, the dullness extending upward to the angle of the scapula. Stereo-radiograms were taken which were of great assistance in the anatomic diagnosis, since they brought out, in plastic effect, the location of the abscess and its relation to the other structures and also the foreign body.

The expectoration had a fetid odor, was green in color, and at each coughing spell, at least half an ounce of pus was expelled. Microscopic examination of the pus shows streptococci, pneumococci, and staphylococci. An operation was decided upon and a modified method of treating abscess of lung employed in this case, which I shall report in detail in another communication on abscesses of the lung and their treatment.

The pin-tack was removed (Fig. 5C) and abscess cavity obliterated with a large skin flap. Two of the bronchial openings have already closed and the discharge has diminished daily. The inserted flap has entirely grown on and covers the inner half of the entire abscess cavity.

**CASE VII** exemplifies a foreign body in the lung which does not show in the roentgenogram, illustrated in the following:—

A young man, *æ*t. twenty-four, developed an empyema four years ago. The cavity was drained as usual, but after a reasonable length of time it failed to stop discharging. The physician in charge tried to paint the walls of the abscess cavity by means of iodine and took a long wooden probe with a pledget of cotton dipped in iodine and wanted to apply it internally through the drainage opening. The end of this wooden probe broke and in spite of all search the doctor could not find the end of that probe in the cavity. Two operations were performed for its extraction, but in neither of these operations could the surgeons find the wooden probe. The cavity was then drained by a large rubber tube for two years.

I removed the rubber tubing and injected the sinus with bismuth paste and obtained a peculiar picture (Fig. 6). It shows the cavity contracted to a channel, occupied by the rubber tube, and one can see distinctly the shadows produced by the granulations which had grown into the holes of the rubber tube.

I did not reinsert the rubber tubing, and behold, next morning the end of the probe was found in the dressing (Fig. 5B). The cavity closed up within a week and has been closed for the past four years.

This last case does not aid us in localizing foreign bodies, but it illustrates that foreign bodies may be present which do not give any shadows in the single picture or in the stereoscopic.

The single radiogram is instructive so far as it shows the size of the existing cavity and also its direction.

In conclusion one might infer from the report of these cases that I regard the external operation as the only means of extracting foreign bodies. This would be an error. The extraction of inhaled objects, such as coins, buttons, etc., by means of the bronchoscope is much to be preferred to operation, provided it is feasible. We have had a series of such cases at the North Chicago Hospital, where the foreign body was extracted through the mouth, but in a certain percentage of cases we were obliged to resort to the external operation; the bronchoscope could not expose the objects.

I wish I could now present this subject in the large military hospitals of Europe, because a reliable method of localizing shrapnel in the chest, or in other parts of the body, must at the present time be to them a welcome aid. Although it is not necessary in every case to extract a bullet as soon as a soldier is shot, the knowledge of its location is always necessary.

I do not wish to convey the impression that the stereo-radiogram is the only means of localizing foreign bodies. We have to consider also the fluoroscope, and I believe that the fluoroscope is preferable to the single radiogram; but it does not give us a permanent record, and the surgeon who is to extract the foreign body is not usually a master in the use of the fluoroscope, and since he cannot study the case very long under the fluoroscope, he will be much better prepared to study stereoscopic radiograms.

At the North Chicago Hospital we are now using this method exclusively, since I introduced it in 1907. I am pleased to say it has now been adopted practically in all large hospitals in this country and in many hospitals abroad, where I demonstrated and published this method five years ago. We employ it also in intestinal work, in studying the diseases in accessory sinuses of the head, in estimating cavities in empyema, in tracing sinuses, in fractures and dislocations, in the diagnosis of pulmonary tuberculosis (in the incipient as well as in the post-tubercular stage).<sup>\*</sup> In fact, we have given up the single radiogram and believe that all those who are progressive in this work will do likewise.

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<sup>\*</sup>Beck: Stereoscopic Radiograph as an Aid to the Surgeon. (*Surg. Gynec. and Obstr.*, 1911.)

Beck: Die Stereoskopische Radiographie in der Chirurgie; ihre Vorteile gegenüber dem einfachen Radiogram.

## EARLY OPERATION FOR SEVERE INJURIES OF THE HEAD. REPORT OF TWO CASES OF MENINGEAL HEMORRHAGE.

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One is impressed with the number of people seeking relief from a great variety of symptoms which are the result of previous injuries of the head. The most common of these symptoms are headache, vertigo, throbbing sensation in the head, defective memory, various degrees of aphasia and convulsions.

The usual history is one of injury to the head accompanied by loss of consciousness continuing from a few minutes to several hours. Often there is bleeding from one ear or the nose. After a few hours the conjunctivæ become ecchymotic. There are one or more convulsions. Varying degrees of aphasia may be present. Later the mind becomes clearer, and the patient is able to be up and about. The attending physician and the family then give a long sigh of relief and hope that all danger has passed.

The patient gets around slowly, takes little interest in affairs, is slow of speech, complains of headache, vertigo, drowsiness, and just when everyone is feeling he has almost, if not entirely recovered, he has another convulsion. His physician is hastily summoned, a second and often a third is called in consultation, and after a brief conference it is decided best not to wait longer, but to 'resort to surgery.'

In the treatment of injuries of the head several points should be especially emphasized. The brain is the most delicate of all the structures of the body and can tolerate only a small amount of traumatism. It is enclosed entirely by the skull which is a protection, but this also produces an added risk from increased pressure. If the brain is impinged on by a tumor or blood clot, it cannot relieve itself of this pressure by a change in its position as so often occurs with other organs. It is estimated that an increase of one-fifth in the normal capacity of the cranium will produce disastrous results. It is also estimated that total anemia of the brain cells for as long as seven minutes prevents their regeneration.

Careful observers have known for a long time that fractures of the skull in which the dura was ruptured were much more favorable than similar fractures with no laceration of the dura, the reason being that the rent in the dura acts as a means for the escape of blood and cerebrospinal fluid and affords a means for relief of pressure.



The mortality in brain injuries will always remain high because in many instances the trauma has produced lacerations of the substance of the brain, and injured the circulation or the basal ganglia to such an extent that recovery is impossible. On the other hand, there is a very large proportion of cases in which death, or partial or complete incapacity, is due not to the injury *per se*, but to the intense intracranial pressure which follows. This intense intracranial pressure is most often due to hemorrhage from one of the large vessels, but may occur from edema; but whatever the cause, it is of vital importance that it should be relieved as early as possible.

In this type of cases early operation for the relief of tension is imperative: (1) to prevent a fatal issue, and (2) to prevent the distressing complications that so often follow, chief of which are paralysis and epilepsy.

Statistics show that 90 per cent. of meningeal apoplexies are fatal without operation, while in a large series of patients operated on, 67 per cent. recover—a percentage which would be much larger were it possible to secure prompt intervention before the usual onset of medullary symptoms in those patients in whom the extravasation takes place rapidly.

The above statistics offer the best argument that can be advanced in favor of early operation. Medical students and the profession generally should be impressed with the fact that early relief of tension by surgical means offers the only hope of relief in many instances. Late operations for traumatic epilepsy and paralysis are most disappointing, and but rarely does the patient receive the expected relief. A late operation for a head injury is like obtaining life insurance after the age of fifty. One loses the protection so sadly needed earlier, and the premiums one must pay are so high as to be almost if not entirely prohibitive. The following cases illustrate the value of early operation:—

CASE I (A136278).—A young unmarried man, *æt.* twenty-eight, was hit with a baseball, about 3:00 P. M. one afternoon, in the left temporal region. He became unconscious immediately, but recovered consciousness in a few minutes. He was then able to walk some distance to his home. During the night he had several convulsions, each one of which lasted two or three minutes. He became more and more stupid and had increasing difficulty with his speech. He came under our observation the following morning, eighteen hours after the injury. Examination revealed swelling over the left temporal region with a blood clot in the soft tissues. The skin was not broken, there had been no bleeding from the nose or ears. The conjunctiva was not injected. The patient was drowsy, but could be easily aroused. He had great difficulty in speaking and could pronounce but a few words.

*Operation: Craniotomy.*—A good-sized osteoplastic flap was turned down from the left motor area. A blood clot 2 inches in extent and  $\frac{1}{2}$  inch thick was at once seen lying over the lower end of the fissure of Rolando. When this clot was removed bleeding occurred from the middle meningeal artery at

a point corresponding to the center of the clot. The vessel was ligated. The dura was opened. There was no hemorrhage inside the dura. No laceration of the cortex, or fracture of the skull could be determined. No convulsions followed the operation. His stupor improved and he gradually regained complete power of speech. Full control of speech did not return for about six weeks. He was examined three months after the injury, at which time he was in perfect health, no dizziness or headache, speech was normal, and he had resumed his occupation as a farm laborer.

CASE II (A134940).—Unmarried man, *æt.* twenty-five. This patient was hit in the left temporal region by a baseball. He immediately became unconscious, and had bleeding from the left ear. He regained consciousness in about fifteen minutes and was able to drive his automobile home. After three days he resumed work as a farmer, and felt perfectly well with no headache or focal symptoms. Ten days later he developed a headache and a convulsion with unconsciousness which lasted half an hour. Upon regaining consciousness, there was some interference with the power of speech. The following day he had so far recovered that he was able to drive his father in an automobile some distance. Later in the day he had to go to bed again, had another severe convulsion with unconsciousness which lasted an hour. From that time until he came under observation, three weeks after the injury, he had many light convulsions—ten in twenty-four hours.

At that time he was somewhat slow in replying to questions, but the power of speech was almost normal. He was able to be up and about except during his convulsions. There were no wounds of any kind on the head; the skin had never been broken.

*Operation: Craniotomy.*—A good-sized osteoplastic flap was turned down from the left temporal and motor area. No fracture of the bone could be found. The dura was not lacerated and there were no blood clots outside the dura. Upon opening the dura, yellow serum escaped and a large partially organized blood clot 4 inches in extent and nearly  $\frac{1}{2}$  inch thick at the thickest portion was seen covering the motor area and extending well down onto the temporal lobe. The clot was organized enough so that it was easily separated from the dura and from the cortex. When it was removed, it was nearly 4 inches across and resembled a good-sized pancake. There was no fresh bleeding and the source of the hemorrhage could not be made out, but since the thicker portion of the clot was directly beneath the middle meningeal artery, we believed that this vessel furnished the hemorrhage. The patient had a slight convulsion the evening after the operation. He was under observation for two and one-half weeks. The drowsiness disappeared and there were no further convulsions.

If these patients had been allowed to continue without operation, it is very probable that at least one of them would have become an epileptic. It is also more than likely that the other would have suffered from aphasia of a greater or less degree.

## GASTRIC ULCER: ITS SURGICAL TREATMENT.

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With the improved methods of diagnosis, the progress in roentgenology and the recent laboratory reports on the frequency of malignancy arising in the indurated form of the gastric ulcer, the indications for surgical interference predominate. Some internists as well as many surgeons may demur at McCarthy's statement that 80 per cent. of gastric ulcers are potentially malignant, yet there is a mass of clinical evidence that cancer has its origin in an ulcer of the stomach more frequently than it was formerly supposed. It naturally follows that when such ulcers do not respond readily to medical treatment they should be operated.

Some of the more imperative indications for surgical treatment are the presence of an inflammatory area about an acute ulcer which causes a disturbance of the motility of the stomach, and cicatricial contraction of a chronic ulcer causing the more or less complete obstruction of the pylorus.

While Finney's pyloroplasty and gastro-duodenostomy are ingenious and admirable theoretically, their practical usefulness is limited. Posterior gastro-jejunostomy is the operation of choice, and with the exception of appendectomy, perhaps no other intervention has had such success in saving lives since its first performance in 1893 by Doyen and the perfection of its technique by the Mayos, Moynihan and Keen.

There is a formidable array of arguments in favor of the theory that the pylorus must be closed in performing gastro-jejunostomy since the stoma of the gastro-jejunostomy will not functionate if the pylorus remains patent. Hartmann, however, showed in 1914 from a series of clinical and experimental observations that the gastro-enterostomy opening will almost invariably functionate provided the opening be situated near the pyloric antrum. Laboratory evidence leans to the conclusion that it is difficult, if not impossible to close the pyloric opening in dogs by the methods usually employed—nor is the closure of the pylorus in the human being always permanent unless the technique includes a complete resection of the pylorus.

Personally, I have not found it necessary to close the pylorus after gastro-jejunostomy, and I consider my results satisfactory although



I have not had as many cases as some of my colleagues. Pylorectomy is the only procedure which offers a positive assurance of obliteration of the pyloric opening, but this operation should be reserved for those cases in which the removal of an extensive ulcer-bearing area is indicated. While pylorectomy may be performed in two stages (Crile, Blumenthal), the mortality in the hands of the average operator is still so large as to justify the conclusion that the utmost reserve in its use is imperative.

In support of the theory of Hartmann that it is indifferent whether the pylorus be left open or not, the following case may be cited.

A. B., *æt.* twenty-four, unmarried. She had been operated upon by Dr. Berg at the Mount Sinai Hospital: gastro-enterostomy, with closure of the pylorus by the method originally described by him. Six months later she was admitted to the Montefiore Hospital. Incessant vomiting and inability to retain food had caused extreme emaciation, and brought on inanition and exhaustion to an alarming degree.

An exploration (May 28th, 1914) showed that the entire small intestine was the seat of innumerable small, round, ulcerated areas. An examination of the gastro-enterostomy opening proved it to be patent. The linen ligature about the pylorus was found perfectly loose, although the original knot was still intact. The tentative diagnosis of tuberculosis of the intestines was made, and although no further surgical intervention was made, the patient showed a gradual and steady improvement and gained 19 lb. in less than four months.

One year later, this patient was operated upon by my colleague, Dr. R. Lewisohn, for a recurrence of her former symptoms. Pylorectomy was performed, and as at the previous operation both the pylorus and the gastro-enterostomy were found patent.

This is a remarkable instance of the adaptability of living tissue which is overlooked by so many operators.

The excision of gastric ulcer, with or without gastro-enterostomy is now much favored by Crile, Rodman and the Mayos. Keen believes it less efficient than gastro-enterostomy, which he performs, even when he excises an ulcer with a limited area of ulceration that is freely accessible. He says that gastro-enterostomy is then necessary to set the stomach at rest and secure the healing of other ulcers which so frequently coexist.

Acute perforating gastric ulcer requires immediate operation, as a fatal termination of the peritonitis is as much threatened in this condition as in appendicitis. The number of recoveries will be in inverse ratio to the duration of the perforation prior to the operation.

The surgical indication is the closing of the opening as quickly as possible. The excision of such ulcers is rarely possible on account of the extensive inflammatory area about the perforation which renders it difficult to determine the real confines of the ulcer. Again the attempt to suture a large opening created by the excision

of an ulcer under these conditions entails the greater difficulty of closing the opening with sutures that prevent leakage.

Experience has shown that an attempt to close a perforation, however small, is difficult, on account of the presence of peritonitis with distention of the intestines which make a satisfactory exposure a trying problem.

The maxim "to get in and to get out as quickly as possible," generally applied to the treatment of appendicitis, may be the criterion in acute perforating gastric ulcer as well. When the perforation is at the pylorus or so near to it that it materially interferes with the function of the opening, a gastro-enterostomy should supplement the closure of the perforation.

This was done in the following case (Case 1176).

Rose I, married, *æ.t.* twenty-six. Previous history unimportant. *Present History:* Patient had suffered from sticking pains in the left hypochondrium which extended to the left flank. Although the pains had been present daily, they had no relation to the ingestion of food. Three days ago, the patient was seized with a severe pain in the right hypochondrium radiating to the middle of the back. She had nausea and intermittent vomiting. No hematemesis. The abdomen was slightly retracted with rigidity over the upper part of the right rectus muscle. In this region can be felt a smooth tender mass continuous with the free border of the liver and extending about three inches below the free border of the ribs.

*Diagnosis:* Perforating gastric ulcer with adhesions. Operation, November 24th, 1915, revealed extensive adhesions of recent origin between the greater omentum, stomach and gall-bladder. The perforation readily admitted the tip of the finger. It was situated just below the pylorus and was completely sealed by the fundus of the gall-bladder which had become invaginated into the opening. The edges of the ulcer were inverted with linen sutures. Posterior gastro-jejunostomy was then performed by the suture method. The patient was discharged on December 8th.

Another danger to the life of the patient from gastric ulcer is illustrated in the curious case of a man of forty-five, clergyman, admitted to the medical service of the Hospital.

*History:* For several years he had had a burning sensation in the lower sternum which set in generally one hour after meals. No vomiting. On the day of admission the patient had suddenly become very weak, followed by an attack of syncope. He then vomited large quantities of blood. No abdominal pain. He was treated for one week in the medical service and placed on a Lenhartz diet. At the end of the week he seemed to be on the fair road to recovery, when he suddenly developed a profuse hemorrhage, vomiting large quantities of blood and passing tarry stools. He passed into a profound shock and required transfusion. Two days afterwards, laparotomy and posterior jejunostomy for duodenal ulcer were performed. The wound closed by primary intention. The following day the patient had another severe hemorrhage, necessitating a second blood transfusion. He then made an uninterrupted convalescence and was discharged from the Hospital two weeks after.

A. C., nursing mother, *æ.t.* twenty-nine. Infant four months old. The history of pyloric obstruction of several months was verified by roentgenograms.

*Laparotomy:* The stomach was distended, the pylorus was the seat of an ex-

tensive indurated scar surrounded by an infiltrated area involving the greater part of the pyloric circumference. Pylorotomy, posterior gastro-jejunostomy and the excision of enlarged glands at the greater curvature of the stomach were performed. The specimen removed showed that the lumen of the pylorus was almost obliterated by an extensive shallow ulcerated area, extending almost throughout its entire circumference. The gross specimen did not present evidences of malignancy nor did the patient appear cachectic, and, on account of her age, malignancy had not been suspected. *Pathological Report*: Carcinoma. The patient was discharged after two weeks.

Post-operative complications in gastric ulcers are painful scars which occur in a small percentage of cases as they do after any other surgical procedure. Post-operative adhesions such as those of the omentum with the parietes are at times unavoidable after gastro-jejunostomy as they are in other abdominal operations in which manipulation of the viscera occurs. For several years I have been in the habit of protecting and walling off the abdominal contents during operations by the use of oriental silk sterilized in liquid paraffin, and the post-operative reaction has been decidedly lessened and the tendency to adhesions following the use of gauze pads has practically been avoided.

Ventral hernia through the attenuated scar may be avoided by proper care in the approximation and suture of the abdominal wall, while post-operative nausea and vomiting will readily respond to lavage.

In regard to the technique, I should like to insist on the great importance of having a large opening which cannot be accomplished by the use of the Murphy button or any other mechanical contrivance. Recurrent ulcer will be found in a certain percentage of post-operative cases even in the hands of the most skilled surgeons, but the use of absorbable sutures for approximating mucous membrane has unquestionably decreased the number of such cases.

969 Madison Avenue.



## TUBERCULOSIS OF THE MAMMARY GLAND.

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By DR. GATEWOOD, of Chicago,  
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Astley Cooper, in 1829, described tuberculosis of the mammary gland in unmistakable terms. Reports of cases, however, were surprisingly few before the advent of microscopic pathology, and since the cases were diagnosed solely upon the macroscopic and clinical features, they are not to be accepted without question. Dubar, in 1881, demonstrated mammary tuberculosis on microscopic grounds, and since his classical description a number of undoubted cases have been reported. In his exhaustive summary, Deaver<sup>1</sup> was able to collect 94 cases of tuberculous mastitis which had been reported between the years 1904 and 1913, including 5 cases of his own. He excluded 15 of this number for lack of sufficient data to confirm the diagnosis. Anspach<sup>2</sup> was able to collect 65 cases prior to 1904. Since 1913, I have been able to find reports of very few cases, although Durante,<sup>3</sup> in 1914, states that he has been able to collect 150 cases, to which number he adds 2 from his own experience. If the number of cases reported is any criterion of the frequency of the disease, one must be impressed with the extreme rarity of tuberculous infection of the breast, particularly when compared with the incidence of tuberculosis in general.

Cases of mammary tuberculosis are usually divided into primary and secondary groups. Anspach, Deaver and most other authors have considered as primary those cases in which the disease was clinically confined to the breast and the axillary nodes on the same side. Klebs, Rippert, Aschoff and others have denied the occurrence of primary tuberculosis of the breast, although a few cases have been reported in which the organisms, in all probability, gained entrance through abrasions of the skin or through the nipple. A careful post-mortem examination would be necessary to establish an unquestionable diagnosis of primary mammary tuberculosis, and I have been unable to find such a case on record. The term *primary tuberculous mastitis* is usually used, therefore, to describe the lesion in patients who, by physical examination and by history, disprove the involvement of other organs. In the light of recent observations upon the occurrence of localized infections caused by blood-borne organisms, it would seem that almost all cases of tuberculosis of the breast are but secondary manifestations of tuberculosis elsewhere. According to the present terminology *secondary tuberculous*

*mastitis* is used to describe the lesion in patients having other demonstrable foci, although I believe the term should be applied to all cases, except the very few in which there is reason to believe that the organisms have gained entrance to the breast through a break in the continuity of the overlying skin or the duct epithelium. In the majority of cases the bacilli reach the breast through lymph-channels, probably by a retrograde embolic process. They may come from the axillary, the cervical or retrosternal lymph nodes; or from the ribs, the pleuræ or the lungs. In many cases it is impossible to say whether the axillary adenitis is preceded or followed by the infection of the breast. So great are the possibilities of a primary focus in some other organ, that every patient suffering from tuberculosis of the breast, though presenting no other demonstrable focus, should be regarded as harboring the disease elsewhere, and be carefully observed for further manifestations.

Tuberculosis of the mammary gland is for the most part a disease of women, only 10 male cases having been reported. No case has been observed before puberty and most of the patients afflicted have been between thirty and fifty years old. No single factor stands out as a predisposing cause. Trauma seems to play small part, although an antecedent mastitis has been recorded in a considerable proportion of cases. As in other organs, anything which tends to reduce the tissue vitality predisposes to tuberculous infection.

The most frequent initial symptom, according to Deaver, is a painless lump in the breast, although Scudder<sup>1</sup> maintains that pain is present in 50 per cent. of cases. Tenderness may be marked, especially during the stage of abscess formation, but it is usually slight at the onset. Any patient presenting a lump in the breast and complaining of pain in the region of the tumor on respiration, should be skiagraphed for tuberculous osteitis of the underlying ribs. While retraction of the nipple may be the primary symptom, it is not peculiar to tuberculosis of the breast, and is therefore of little significance. The progress of the disease is usually rapid enough to bring the patient to the surgeon during the course of the first year. Contrary to many textbook statements, tuberculous mastitis is not only compatible with excellent health, but the majority of patients have been robust women. The diagnosis can only be made with certainty by means of bacteriological, pathological and animal inoculation methods. Chronic suppurative mastitis may pursue an identical course with the formation of multiple fistulæ. On the other hand, the tuberculous process may not form fistulæ, and remain for years as a cold abscess which resembles a gumma, a cyst, or even a carcinoma. One breast is involved as a rule, although axillary involvement may be bilateral. The lymph-nodes on the side corresponding to the lesion are enlarged in 60 to 70 per cent. of all cases. The presence of fistulæ, retraction of the nipple and enlarged

axillary nodes on the affected side are the most constant physical signs in tuberculosis of the breast. The disease rarely occurs in the periphery, and, according to Bloodgood,<sup>5</sup> it is usually in the nipple zone.

Pathologically, mammary tuberculosis does not differ from tuberculosis in other tissues. The majority of cases belong to the nodular variety, which may take on a discrete, a disseminated, or a confluent form. In the discrete, nodular variety, the bacilli lodge in the stroma of the gland and incite a localized tubercle formation. An irregular mass gradually forms which is slightly tender. It varies in consistency owing to the amount of caseation and liquefaction present. On account of scar formation, there is apt to be retraction of the nipple, especially if the process is centrally located. The skin finally becomes adherent to the mass and assumes a dark red color. This is followed by spontaneous rupture with the discharge characteristic of a cold abscess, and persistent sinus formation. As in the lung and other organs, the nodule may be walled off and a permanent cure result, or the process may become dormant, abscess formation occurring years later. The disseminated form is much more rare. It resembles the discrete, except that instead of one there are many small nodules. This variety runs a much more rapid course, and seldom becomes quiescent. The disseminated nodules may become confluent, with large areas of caseation and liquefaction. Scott<sup>6</sup> has described still another variety in which the predominating pathological feature is a diffuse sclerosis. While some sclerosis occurs in nearly every case of the nodular variety, there is no abscess formation in the true sclerotic type. It may best be compared to a fibroid phthisis with its epithelioid tissue infiltration. This type is most often seen in patients advanced in years, and is usually mistaken for carcinoma. Diagnosis is usually made after microscopic sections have been examined and the bacilli demonstrated in the tissues. Ingier<sup>7</sup> has recently described a case in which the involvement was confined to the walls of the excretory ducts and the periacinous connective-tissue, with slight involvement of the interlobular stroma. Detachment of the epithelium resulted in a final obliteration of the lumina of the ducts. To this variety he has given the name 'mastitis tuberculosa obliterans.' Acute miliary tuberculosis of the mammary gland has been recorded, usually as a part of a generalized tuberculosis. It is very rare and does not differ essentially from the disseminated form of the nodular type.

Tuberculosis of the breast must be differentiated from actinomycosis and syphilis. These lesions are even more rare than tuberculous mastitis, and with careful histories and modern methods of laboratory diagnosis, little doubt need remain in making a diagnosis. In event there is still some question, the effect of antiluetic treat-



ment should make their diagnosis reasonably sure within a short time, as potassium iodide is almost specific for either lesion. Differentiation from chronic mastitis is not always so easy, and removal of tissue, which is after all the only absolute method of making a diagnosis, may be necessary. The sclerosing type or the discrete nodular type in which the process has become latent, without fistula formation, may give all the symptoms of mammary carcinoma and defy clinical differentiation. In such cases the use of the freezing microtome may save the patient a radical operation and permanent disfigurement.

The treatment of tuberculous mastitis in the past has been mainly surgical, and operative measures have given such uniformly good results that they seem to be justified, at least until something more is offered in the way of non-operative therapeutics. It is perhaps just to say that operative measures have been too radical in the past, for it has been repeatedly demonstrated that complete excision of the breast and glands is not necessary, especially in the so-called primary cases of tuberculosis of the breast. In the sclerotic type of cases and in the discrete, nodular variety, where the glands are not involved, simple excision of the tuberculous mass is sufficient to effect a cure, although most of these cases have been mistaken for carcinoma and radical operations performed. It must not be forgotten, however, that carcinoma may accompany tuberculosis. Klose<sup>8</sup> was able to collect 17 such cases. Where the entire gland is involved in the disseminated type, radical removal will save the patient much unnecessary loss of time, and prevent the occurrence of secondary foci developing from the breast lesion. In secondary cases developing from the ribs or the mediastinum, removal of the breast may not only be useless, but may be definitely contraindicated. In such cases, palliative measures, or the removal of as much tuberculous material as possible may be all that is warranted. In cases in which there are no other demonstrable foci, the prognosis is good. No death has been reported as the result of an operation for tuberculous mastitis, and the majority of cases which have been followed have been reported as entirely well. When a patient presents other clinical symptoms of tuberculosis, the prognosis depends entirely upon the general condition of the patient, the activity and extent of the primary lesion. It is scarcely necessary to call attention to the fact that each patient should be placed upon a careful hygienic régime for a considerable period of time after an operation for tuberculous mastitis. Such a patient should be observed at frequent intervals over a much longer period for further evidences of tuberculosis. Tuberculin treatment is of questionable value, and if used at all should follow surgical procedures and be considered as an adjunct to general hygienic measures.

From a survey of all the available literature one is justified in drawing the following conclusions:—

1. Tuberculosis of the mammary gland is very uncommon considering the frequency of tuberculosis.

2. The term 'primary tuberculous mastitis' should be applied only to those cases in which there is definite evidence that the infection was introduced directly into the breast tissues.

3. The symptoms are varied and the diagnosis should be made certain by the aid of the microscope before radical operations are undertaken.

4. The pathology, although varied, does not differ essentially from that of tuberculosis in other organs.

5. The treatment is surgical in almost every instance, but the postoperative care of the patient is very essential to complete recovery.

6. The prognosis is excellent provided the general condition of the patient is good.

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<sup>3</sup> Durante (*Policlinico*, Roma, 1914, Vol. XXI, p. 319).

<sup>4</sup> Scudder (*Amer. Jour. Med. Sc.*, 1898, Vol. CXVI, p. 75).

<sup>5</sup> Bloodgood (*Gynecology and Abdominal Surgery*, Kelly and Noble, 1910, Vol. II, p. 211).

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<sup>7</sup> Ingier (*Virchow's Arch. fuer path. Anat.*, 1910, Vol. CCII, p. 217).

<sup>8</sup> Klose and Vogt (*Beitr. zur klin. Chir.*, 1910, Vol. LXVI, p. 1).

## A NEW METHOD OF FRACTURE FIXATION.

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By GEORGE W. HAWLEY, M. D., of Bridgeport, Conn.

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The majority of fractures are successfully treated by simple methods. In some cases, however, operation is indicated in order to secure satisfactory approximation of the fracture ends. This is usually effected by the use of plates, or other internal splints which are permanently fastened to the bone. These splints, although permanently buried, serve only a temporary purpose. Frequently their only use is to hold the fragments until the limb is immobilized in plaster. At other times considerable force is required to maintain the reduction, and the fixation must be continued for a time, but in no case does an internal splint have any value after ten to fourteen days.

Theoretically, an ideal method would be one in which the internal fixation is only temporary. With this purpose in view I had constructed about two years ago a peculiar clamp which can be directly applied to fractures, and withdrawn after the wound is closed and the limb incased in plaster. It can be removed without cutting the cast, disturbing the dressings or exposing the wound.

This instrument (Fig. 1), consists of a long slender bar, a loop of heavy woven bronze (or ordinary picture) wire attached to a sliding block and thumb screw. The wire loop is designed to encircle the bone and engage the end of the bar to form a false knot (Fig. 2). By turning the thumb screw in one direction the wire loop is drawn around the bone in a powerful grip, and turning in the other direction, the loop is released. The two strands of cable provide a double grip and can be so spaced as to provide effective hold on an oblique fracture (Fig. 4) and embrace both ends of a transverse fracture (Fig. 3). The bar is thin, flat, occupies little room in a closed wound and is easily removed.

The method of using this clamp is simple. The fracture is exposed according to the most approved fracture technique, and the broken ends approximated in the usual way. The pointed end of the clamp with loop attached is introduced into the wound and the loop passed around the bone. The two strands of wire are spread apart and hooked over the end of bar as shown in Fig. 2. Care is taken to see that the loop is made so that a false knot is formed. With the ends of the wire securely fastened to the block, the thumb screw is turned until the loop is drawn tightly around the bone and the fracture held securely. The wound is then closed, leaving the



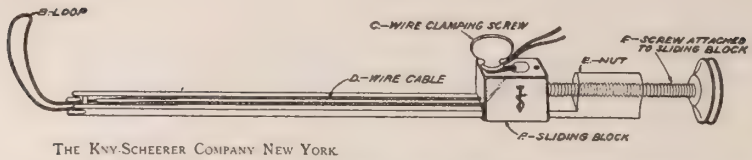


Fig. 1.—Wire fracture clamp designed so that it may be removed after the wound is closed and plaster cast applied. It consists of a thin steel bar, from one end of which is looped heavy woven wire. At the other end is a sliding block to which the wire is fastened and which is controlled by a powerful hand screw.

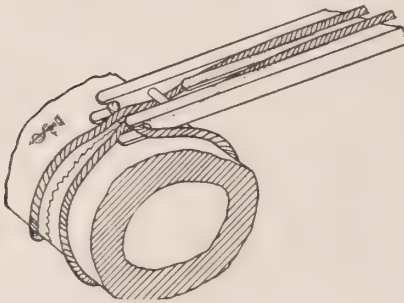


Fig. 2.

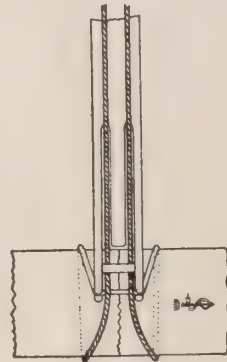


Fig. 3.

Fig. 2.—Illustrating how wire cable is looped around bone and engaged in end of bar to form a false knot. Traction on the wire locks the loop around the bone in a firm grasp, and slackening automatically releases it.

Fig. 3.—Side view of clamp applied to transverse fracture. Provision has been made for a sufficient spread of the wire loop to embrace both fragments.

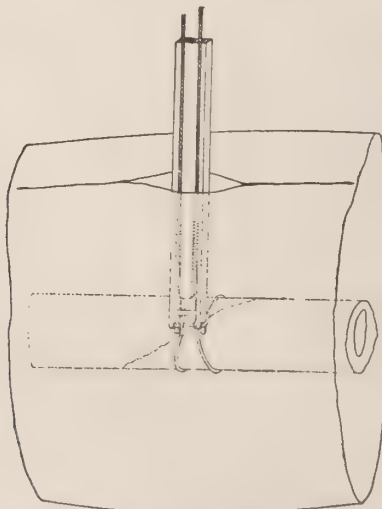


Fig. 4.—Clamp applied to oblique fracture showing double grip on bone with bar protruding through wound.

bar protruding through the incision (Fig. 4), dressings are applied and the limb immobilized in plaster. The clamp may be removed at once or allowed to remain for a few days. It is withdrawn by turning the thumb screw until the wires are sufficiently slack for the loop to slip off the end of the bar and permit the clamp, wire and all, to be lifted out of the wound.

It often happens that ideas which look very beautiful on paper fail in some respects to come up to expectations, and this device has proved no exception to the rule. It is not that this instrument has failed to do what was expected of it, but certain facts have been brought out which limit its usefulness. Like most methods,

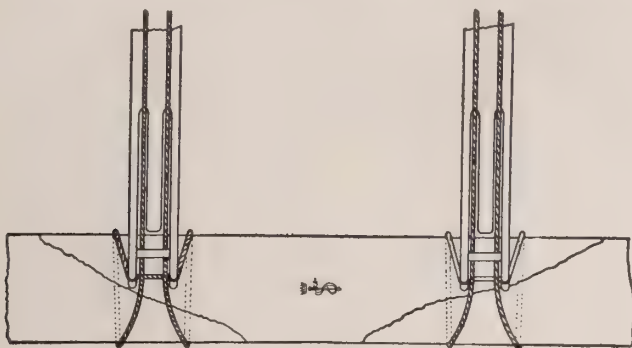


Fig. 5.—Fixation of double oblique fracture with two clamps.

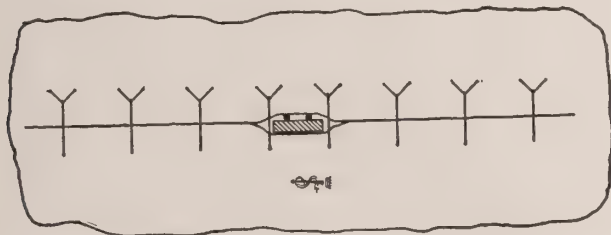


Fig. 6.—Schematic drawing showing space occupied by bar in closed wound. In cross section bar is  $\frac{1}{2}$  by  $\frac{1}{8}$  inch.

it has its own limitations. Experience has shown that in all fractures where there was much of any tendency to displacement it was necessary to hold this instrumental fixation for several days. Whenever the clamp was removed early in cases subject to strain, relapse occurred, in whole or in part. In other words the plaster immobilization was insufficient to hold the fixation. For some time I have been convinced that plaster fixation, no matter how well or how early it is done, is totally unable to hold fractures in which there is much displacement strain. I have repeatedly put up a fresh fracture of the femur in a very extensive plaster spica, applying powerful, uniform traction under ether, with the muscles com-

pletely relaxed and the injured limb increased in length, only to have roentgenographic examination a few days later reveal serious overriding and displacement.

Another disadvantage was the fact that a few cases, in which the clamp was left on the bone for any length of time, became infected. This occurred despite the most careful protection and undoubtedly the infection was derived from the skin adjacent to the wound. In every case the type of infection was mild without elevation of temperature. There were three of these cases, and healing in each case was without incident.

The only other difficulty encountered was the tendency of the wire loop to become caught on a point of bone when the clamp was withdrawn. This occurred in two cases in which the fragments slipped as soon as the tension of the wire was released. In both instances the wire was removed at a second sitting without opening the wound and without subsequent ill effects.

Altogether this method has been used in seventeen cases. No foolish or exaggerated claims are made for it, but it has been sufficiently tested to prove that it has a distinct field of usefulness. Fractures which require operation may be divided into two groups; those which necessitate force to hold the fragments in place and those which require little support to hold them once they have been replaced. To the latter belong transverse fractures, wedge fractures and oblique fractures with sharp serrations. It is in these cases that this clamp is appropriate and effective. It is also useful in infected compound fractures, where it not only holds the fragments in position but assists wound drainage.

The roentgenograms shown herewith illustrate two different types of cases. The oblique fracture of the tibia in Fig. 7 had twice resisted replacement under ether. Operation on the tenth day proved that great force was required to secure approximation and hold it. In Fig. 8 is clearly seen how well the wire clamp held the reduction. In this case the instrument was left in place for eight days. The other case was a transverse fracture of the femur in which efforts to effect contact of the broken surfaces had failed (Fig. 9). Complete reposition and fixation of the fracture by the clamp is plainly shown in Fig. 10. In this case the clamp was withdrawn as soon as the patient had been transferred to bed from the operating room. In both cases, perfect anatomical and functional results were obtained.

One of the technical difficulties attending any fracture operation is the holding of the fracture after reduction while the work of fixation is being done. There are a number of excellent bone holding forceps, but none provides an effective hold of the fracture and adequate access to the bone at the point of fracture. The Lowman clamp is an effective instrument for plating fractures, but it does



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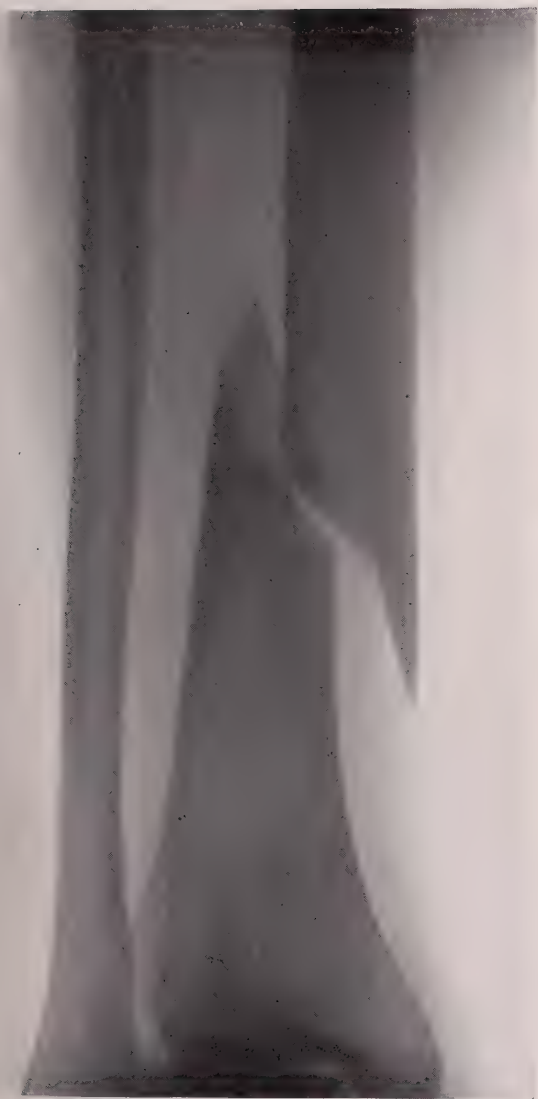


Fig. 7.

Fig. 7.—R. J. L., *æt.* thirty-eight. Roentgenogram taken on seventh day, after two attempts at replacement by manipulation under ether.



Fig. 8.

Fig. 8.—R. J. L. Roentgenogram on fifteenth day (fifth day after operation) shows perfect fixation by clamp. Clamp removed on eighth day.



Fig. 9.

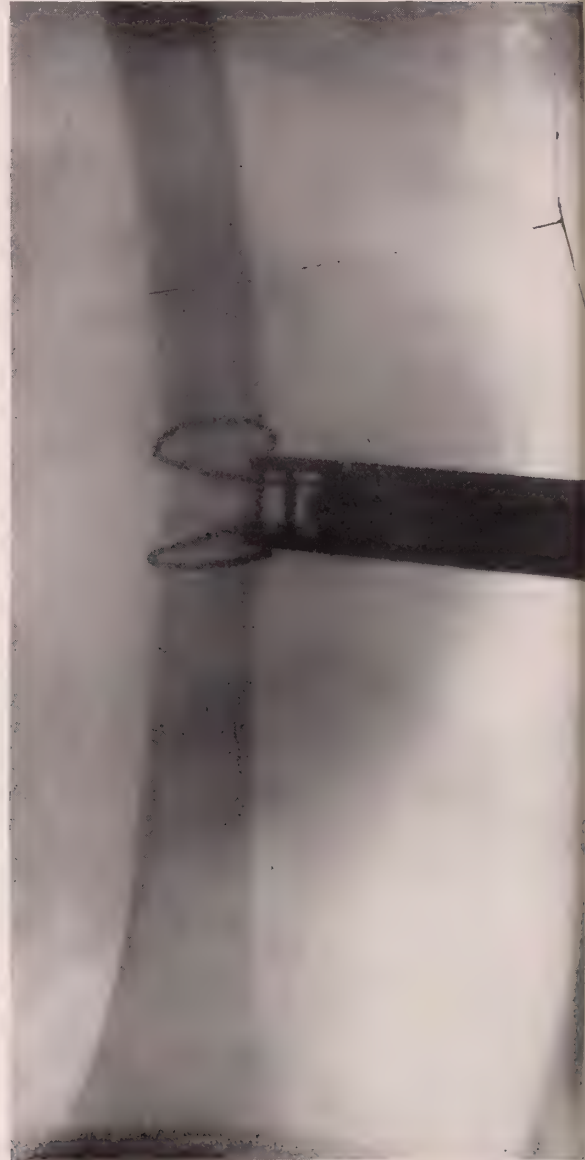


Fig. 10.

Fig. 9.—J. D., *et.* twelve. Roentgenogram on fifth day. No contact after violent traction under general anesthesia and immobilization in plaster spica.

Fig. 10.—J. D. Roentgenogram immediately after operation indicates how effectively this clamp holds a transverse fracture. Instrument withdrawn soon after operation.

not sufficiently expose the bone to be of service in other fracture operations. In order to overcome this fault I have been using a modification of the Lowman clamp (Fig. 11) which leaves the entire width and circumference of the bone accessible. The object was to have an instrument which would not only hold fractures for the application of the wire clamp, but would be equally serviceable for plating (Fig. 12), grafting and other methods of fixation.

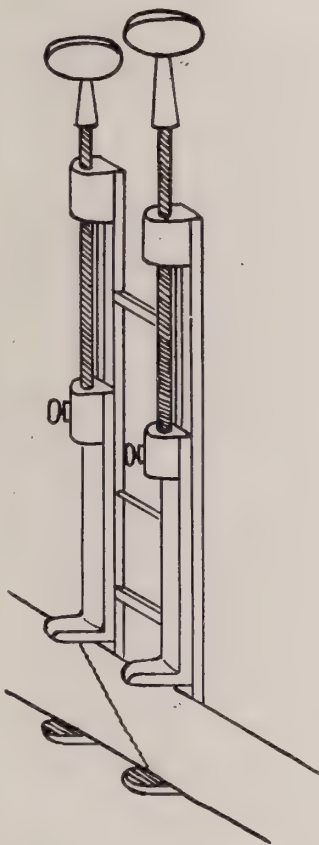


Fig. 11.

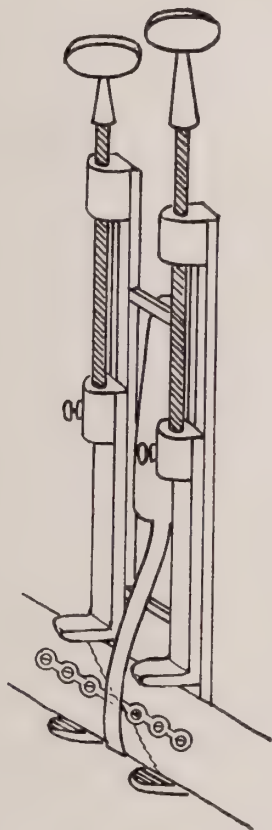


Fig. 12.

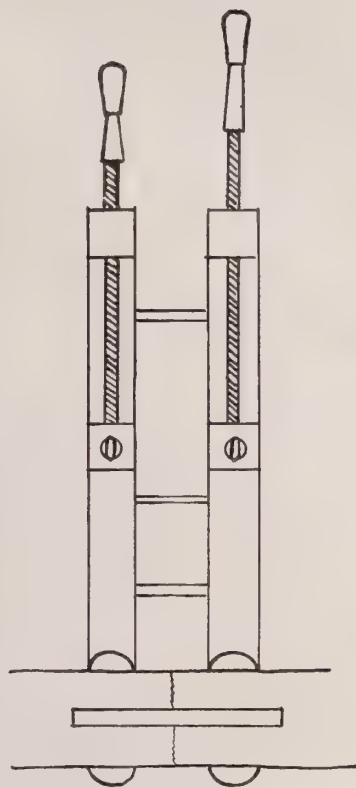


Fig. 13.

Fig. 11.—Modified Lowman bone-holding clamp designed especially to give free access to surface and circumference of bone.

Fig. 12.—Showing application of clamp for plating operation.

Fig. 13.—Showing use of clamp in bone grafting where it is necessary to have ample room and unobstructed surface for the operation of the motor saw.

This new Lowman clamp has been used long enough to prove that straight jaws will hold a bone just as effectively as those with claw-like fingers, which encircle the bone. Thus it is possible to expose the entire width of the bone without obstruction, making ideal conditions for almost any kind of operation and especially for inlay bone grafting (Fig. 13) and the use of the motor saw.



## PNEUMOTHORAX PUNCTURE.

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By EDWARD VON ADELUNG, M. S., M. D., of Oakland, Cal.

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The Brauer incision for inflating the pleura has no advantages over the Forlanini puncture. Indeed, it increases the operative difficulties and increases the danger of infection. For these reasons the Forlanini puncture is the only operation that should be used to produce pneumothorax.

*Selection of Site.*—I note that authors differ as to the site for the puncture. Generally, it is obvious that one would prefer a point distant from the heart, aorta, spinal column, and large internal blood-vessels and nerves. Also, one prefers a space free from thick muscles, like the pectoralis or spinal muscles. Finally, in the lowest intercostal spaces the diaphragm domes up at such an acute angle as to render piercing it possible. Hence, one naturally avoids the supraclavicular space, the space adjacent to the spine, the lowest intercostal spaces, and of course, the precordium and areas immediately adjacent to the sternum. As it is impossible to predetermine the location of pleural adhesions, they are not taken into account in making the first puncture. They are considered only when they have frustrated attempts at inflation. Then one considers where one may most likely expect the pleura to be free. Without going into details of this subject, which the author has treated in a previous publication,\* attention is called to the fact that frequently free pleural space is found anteriorly in the second and third interspaces when the generally preferred lower areas toward the base have been found obstructed.

*The Needle.*—In the early days of pneumothorax operation, it was thought to be of great advantage to use a dull needle. Many operators still hold this belief. It was supposed that the dull point having penetrated the parietal pleura, would push back the lung without penetrating the visceral pleura. This sounds well theoretically, but after wide experience the author can say that he has never yet encountered a single case in which the dull needle was of any service when the sharp needle failed to find the pleural space, so that for a long time the author has used no other than sharp needles. The sharper they are, the better they are in all respects. The sharp needle is more pleasant for the patient, who dislikes the jabbing sensation produced by pushing a dull point through fascia and

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\*Von Adelung: Pneumothorax Puncture Sites. (*Interstate Med. Jour.*, Vol. XXII, No. 8, p. 846.)

pleura. And the sharp needle obviates the need of the bistoury to cut the skin. My needle is about 9 cm. long, and is known by instrument-makers as the Stovain needle. It is perfectly straight with no attachments save a bulbous end, shaped to take the rubber tubing from the apparatus. While it is true that a length of 3 to 4 cm. is generally more than is needed to penetrate the thickness of the thoracic wall, the added length of the needle serves as a convenient handle. To search beyond the depth of the chest wall for the pleural space convicts the operator of anatomic ignorance. It is of extreme importance that the needle be dry. Moisture of any kind,—water, alcohol, or blood,—in the lumen of the needle prevents or perverts the manometer readings in such a way as seriously to mislead. My needles, after being boiled, are laid in alcohol. They are blown out by compressed air just before use.

*Posture.*—When the ribs lie very close together it is advisable to separate them by placing a pillow under the lower thorax. When this is done it should be borne in mind that the unusual posture affects the manometer, causing the readings to be higher on the positive side. Simply raising the arms above the head will often alter the manometer readings. Thus it is seen that posture affects the pressure readings. Usually the patient may lie in a natural, comfortable horizontal position. But when it is desired to introduce gas in the presence of pleuritic fluid, the fluid-level should first be determined, preferable by fluoroscopy, and the needle can then be introduced into the free space above the fluid level, for which purpose it will be found that the sitting or semi-reclining position will best serve the purpose.

*Technique of Puncture.*—The chosen site is sterilized by painting with tincture of iodine. After this has dried, it is washed off with alcohol. A sterile hypodermic syringe containing a sterile 2 per cent. solution of novocaine with adrenalin is injected intradermically, subcutaneously, and into the successive layers of tissue until the pleura is reached. The skin and the pleura, being the most sensitive tissues, call for the most careful anesthetization. Five to ten drops suffice. In a few moments the sterilized gas-needle may be introduced without pain. In introducing the gas-needle, care should be taken to avoid the edges of the ribs. After passing the point through the skin, which is easily accomplished with a sharp needle, without previous cutting, *and before the whole thickness of the thoracic wall has been penetrated*, the rubber tubing is slipped over the end of the needle and the three-way stopcock opened to the manometer. The apparatus thus being ready to record any pressure change, the needle is pushed slowly onward until it reaches the pleura. If the pleura is not adherent, the manometer will immediately record the arrival of the needle in the pleural space. The distance at which this will occur should be judged by computing the thickness of the

chest wall. Most writers agree that when the needle arrives in the pleural space the manometer indicates the fact by regular oscillations, varying in length from 1 to 4 cm. of water. And indeed this is the only trustworthy indication of safety, and gas should not be introduced until this indication has been obtained. However, it must be stated here that the viscosity of the contiguous pleural layers frequently holds them together even after the needle-eye is between them. *But the manometer will then give a sudden jerk to 1 or 2 cm. negative pressure, though free oscillations will not occur.* By allowing a *very little* gas, 2 or 3 c.cm., to flow through the needle, the pleuræ are separated, and satisfactory oscillations will be obtained, indicating safety. The oscillations should be free, and synchronous with the respiratory movements. Unless one is aware that the viscosity of the pleuræ may prevent free oscillations until some gas has been introduced, one may easily be deceived and abandon a good puncture for lack of ability to recognize this earliest signal of the manometer—namely, *a sudden jerk to negative pressure.* It is my impression that with the dull needle this early signal is not as readily obtained as with the very sharp needle.

*Dressing.*—When the treatment is finished it is unnecessary to apply any dressing whatever unless high positive pressure has been induced. In that case a compression bandage will be found of value to prevent subcutaneous emphysema. Generally, I prefer to have the patient apply digital pressure through a sterile pad for about twenty minutes, when it may be removed and no further care taken. Even with high pressure, 30 or 40 cm. or more of water, the puncture closes within twenty minutes. Either pleural exudate, blood clot, or mere adhesion probably occurs rapidly, for I have repeatedly introduced a pressure of 40 cm. positive without getting subcutaneous emphysema when the patient has used digital pressure for twenty minutes.

The Forlanini puncture is simple, safe, painless, and successful in the hands of an operator who gives attention to details and understands his apparatus.

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NOTE.—C.CM.=cubic centimetre (volume).  
CM.=centimetre (pressure).



## BOOK REVIEWS.

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### BACTERIOLOGICAL METHODS IN FOOD AND DRUGS LABORATORIES.

With an Introduction to Micro-Analytical Methods. By Albert Schneider, M. D., Ph. D. (Columbia University), Professor of Pharmacognosy and Bacteriology in the College of Pharmacy of the University of California, San Francisco. 87 Illustrations and 6 Full Page Plates. Philadelphia: P. Blakiston's Son and Co. 1915. Price, \$2.50.

The scope of this book is best set forth in the first sentence of the author's preface: "The administration of the Federal Pure Food and Drugs Act and of the several State Pure Food and Drugs Laws has made the introduction of bacteriological methods into food and drugs laboratories a necessity. . . . The volume is primarily intended as a guide to students who are interested in the bacteriological examination of foods and drugs."

First, in a short section, the micro-analytical methods in foods and drugs laboratories are taken up; the most important methods are considered and the author at the same time refers to the matter of equipment and standard methods of making reports. In connection with the analytical consideration it is shown where the bacteriological examination must amplify or complete the report.

The largest part of the book is taken up with the bacteriological methods of examination of foods or drugs. This portion of the book covers not only the laboratory methods, but also touches upon the theoretical side and the larger practical or hygienic side. The causes of the bacterial contaminations are considered and given their due importance.

We find among the subjects considered, the numerical limit of micro-organisms in foods and drugs, sewage contamination, methods for the examination of water, milk, shellfish, meats, eggs, syrups, fermented foods or beverages, and finally methods for the standardization of disinfectants, and for the testing of sera and related products both for purity and quality.

The methods advised are excellent and the description of these is clear and concise.

The quality of the illustrations is good, and with but few exceptions they serve their purpose very well. The very important matter of the index has been well cared for, as must be evident when we consider that in this book of somewhat less than 300 pp., ten are devoted to the index.

Schneider's book should certainly find a place in the laboratory of those engaged in food and drug examination, and will prove of value in many bacteriological laboratories.

### DIAGNOSTIC AND THERAPEUTIC TECHNIC. A Manual of Practical Procedures Employed in Diagnosis and Treatment. By Albert S. Morrow, A. B., M. D., Clinical Professor of Surgery in the New York Polyclinic, etc. etc. With 860 Illustrations, Mostly Original. Second Edition, Thoroughly Revised. Philadelphia: W. B. Saunders Company. 1915. Price, \$5.00.

This book fills a quite unoccupied field. While the various technical procedures may be found scattered through a half dozen or

more books on different subjects, this seems to be the first serious attempt in English to gather all the commonly employed diagnostic and therapeutic methods into a single book. The work is profusely illustrated with well-chosen drawings which are a valuable auxiliary to the descriptive text. Each procedure is described with much attention to detail. However, an author who, unaided, attempts to describe such a tremendous variety of technical methods, must of necessity fall into error now and then. A correct appreciation of technical detail depends upon more or less extended personal experience, and to acquire experience in every realm of medical technique is too much to be expected of one man. To cite one instance, the author, in describing the use of the pneumatic proctoscope, states that "the Sims position may be employed instead of the knee chest, if desired," and "the inflating apparatus distends and straightens out the canal as the instrument is advanced." Now the men who have been foremost in the development of the pneumatic proctoscope lay particular stress upon the importance of the knee-chest position being necessary to the success of the examination. They likewise warn against the danger of blowing air into the bowel with the idea of inflating it, but advise utmost caution and the use of only of enough air to lift a bowel fold here and there.

The fields of hydrotherapy and mechanotherapy remain untouched, and only sparing mention is made of the various forms of thermotherapy. In short, the field is too broad to be well covered by any one man. Would it not be better to have a text written with the same end in view, but by a number of men, each with particular experience in his own field?

**DISEASES OF THE SKIN.** By Henry H. Hazen, A. B., M. D., Professor of Dermatology in the Medical Department of Georgetown University, etc. etc. Two Hundred and Thirty-Three Illustrations, Including Four Color Plates. St. Louis: C. V. Mosby Company. 1915. Price, \$4.00.

During the last two years a number of excellent volumes upon skin diseases have been published. The supposition must be that there is a demand for them, and it is gratifying to the specialist to feel at any rate that the literature upon skin diseases is extending its usefulness. Hazen's book is carefully written and is somewhat different from the usual textbook on the same subject in that the author utilizes a number of quotations not often seen in a work on skin diseases, and is not all impersonal in his attitude. This is exceedingly refreshing, and to those accustomed to skin literature it is most interesting and readable. Moreover, his style is terse and agreeable, and with these factors at his command it is easy to understand how well he succeeds in placing each subject before the reader in a simple manner.

Hazen through his study of skin diseases in negroes has made a position for himself in American dermatology. Living in a southern city with a large negro population, he has had ample opportunity to make a special study of cutaneous phenomena in this race. The book is of special value on this account, as most dermatologists lack special knowledge in the appearance and course of skin diseases in the darkly, deeply pigmented races.

We are glad to see that the author has not followed the usual

beaten track in his classification of subjects. He has attempted to class them upon an etiological basis, which makes it far more comprehensive and practical for the reader, especially the student. For instance, in Chapter IX he discusses diseases due to local irritation; in Chapter X, those due to local bacterial infection, etc., and although he has not been able to make this classification complete on account of the lack of knowledge of the etiology of all skin diseases, yet we feel that a volume written in this way is a happy departure and one that should be encouraged.

**PHYSICAL DIAGNOSIS.** By Richard C. Cabot, M. D., Assistant Professor of Medicine in Harvard University, Chief of the West Medical Service at the Massachusetts General Hospital. Sixth Edition. Revised and Enlarged, with 6 Plates and 268 Figures in the Text. New York: William Wood and Company. 1915. Price, \$3.25.

In this, the sixth edition of Cabot's popular textbook, the chapters on the diseases of the heart and lungs have undergone extensive revision. The author still persists in giving niggardly credit to the clinical value of the graphic methods of examining the pulse and heart. It may be very true that the practitioner need not make tracing curves in every case of cardiac arrhythmia which he sees. On the other hand, to declare in effect, that he need never make them, seems to underestimate considerably the value of this means of diagnosis. For in no other way can the practitioner so well acquaint himself with the various types of cardiac irregularity and their significance as by an actual use of these instruments of precision.

Despite individual bias of this sort on various subjects, Cabot's book is most useful to the student and practitioner, for unlike the great majority of such works it is the expression of the author's own experience,—an explanation and discussion of those diagnostic means which he himself has found of practical value. He shows particular sympathy with the difficulties encountered by the student of medicine and devotes much space to a discussion of the ways in which these can best be met. A book written on the plan indicated must necessarily be incomplete, with many well-established diagnostic procedures not touched upon. Its great value, therefore, is not as a work of reference, but as a record of the experiences of a careful, thoughtful clinician who has had wide opportunities for observation.

**THE PRACTICAL MEDICINE SERIES.** Comprising Ten Volumes on the Year's Progress in Medicine and Surgery. Under the general Editorial Charge of Charles L. Mix, A. M., M. D., Professor of Physical Diagnosis in the Northwestern University Medical School. Volume IX. **SKIN AND VENERAL DISEASES.** Edited by Oliver S. Ormsby, M. D., Professor and Head of the Department of Skin and Venereal Diseases, Rush Medical College. With the Collaboration of James Herbert Mitchell, M. D., Research Fellow in Pathology, Rush Medical College. Miscellaneous Topics. Edited by Harold N. Moyer, M. D. Chicago: The Year Book Publishers. 1915. Price, \$1.35.

This little volume is one of a series of ten issued at monthly intervals and covering the entire field of medicine and surgery.



These are written primarily for the general practitioner and arranged in separate volumes so as to allow the physician to buy those devoted to special subjects.

In the present volume excellent judgment has been exercised in the selection of subjects, and the reader will be benefited by the discussions of the progress which has been effected during the year, and no doubt will be further benefited by gaining an idea of each author's work, which without the discussions would be incomplete.

The chapter devoted to syphilis is particularly good. It is very important for one in every branch of medicine to keep abreast of the rapid advance that is being made in the proper understanding of syphilis. Therefore, reviews of the work done in this line are very important to those who have no access to a large number of medical journals.

THE MEDICAL CLINICS OF CHICAGO. Volume I, Number 2 (September, 1915). Octavo of 194 pages, 44 illustrations. Published Bi-Monthly. Philadelphia: W. B. Saunders Company. 1915. Price, per year: Paper, \$8.00; Cloth, \$12.00.

Any innovation which increases the efficiency of teaching methods is to be welcomed. On the other hand, innovation is not a justifiable end in itself. We do not believe that the "Medical Clinics" serve a useful purpose. The device of an exchange of questions and answers between the clinician and his visitors (the form in which most of the subject-chapters are arranged) aims at presenting the salient points of the case more vividly than can be done in the usual manner, but we doubt if the desired end is reached. The material of the discussions is little different from the ordinary textbook articles, and the manner of its arrangement makes it more difficult to grasp, rather than less so. We can conceive of a discussion in the Socratic style being used to drive home some cardinal or unique point in a clinical case, but we fail to see the value of loose, sporadic conversational digressions which often turn about some trivial or even unrelated point.

COLON HYGIENE. Comprising New and Important Facts Concerning the Physiology of the Colon and an Account of Practical and Successful Methods of Combating Intestinal Inactivity and Toxemia. By J. H. Kellogg, M. D., LL. D., Superintendent of the Battle Creek Sanitarium, etc. etc. Battle Creek, Michigan: Good Health Publishing Co. 1915.

Kellogg's book is the result of his personal experiences at the Battle Creek Sanitarium and bears the individual stamp which characterizes the work of this institution.

It emphasizes the fact that attention to detail in carrying out even the most simple and fundamental methods of treatment is of prime importance. Diet and the various forms of mechano- and hydrotherapy are the chief agents which the author employs. At a time when the surgeon is recommending omentopexy, colon resection and other radical measures in the treatment of constipation and its allied disorders, it is well that we should be reminded of how much can be accomplished by less heroic measures.

**AN INTRODUCTION TO BACTERIOLOGY FOR NURSES.** By Harry W. Carey, A. B., M. D., Former Assistant Bacteriologist, Bender Hygiene Laboratory, Albany, N. Y., etc. etc. Philadelphia: F. A. Davis Company. 1915. Price, \$1.00.

If nurses were required to learn to do bacteriological laboratory work, this little book would be of value to them in giving the first principles, clearly and concisely. Even though such work is not required, the book still has very definite merits, as it is written with the idea of combining clinical and laboratory bacteriology.

The book touches upon history, etiological relation, pathology, diagnosis, treatment and hygiene. Of course it refers to all of these but briefly, but it seldom fails to seize upon the vital points and to emphasize these.

It would have been better to have omitted some of the illustrations; others are, however, excellent.

A brief index completes this very serviceable book.

**INJURIES OF THE EYES, NOSE, THROAT AND EARS.** By Andrew Maitland Ramsay, M. D., F. R. F. P. S. (Glasgow), Ophthalmic Surgeon, Royal Infirmary, Glasgow, Major R. A. M. C. (T. F.); J. Dundas Grant, M. D., F. R. C. S. (Eng.); H. Lawson Whale, M. D. (Camb.), F. R. C. S. (Eng.); and Charles Ernest West, F. R. C. S. (Eng.) New York: Oxford University Press. 1915. Price, \$1.00.

This little guide book has been prepared by the distinguished English surgeons, whose names appear on the title page. It is intended especially for Military Medical Officers who have to deal with injuries of the eye, ear, nose and throat, at the front. It does not pretend to be exhaustive in any sense of the word, but gives simple and concise directions for caring for military injuries of the eye, ear, nose and throat.

**THE PRINCIPLES AND PRACTICE OF OBSTETRICS.** By Joseph B. DeLee, A. M., M. D., Professor of Obstetrics at the Northwestern University Medical School, etc. etc. With 938 Illustrations, 175 of Them in Colors. Second Edition, Thoroughly Revised. Philadelphia: W. B. Saunders Company. 1915. Price, \$8.00.

Though comparatively a newcomer in the field, this volume does not need any further introduction or commendation. The complete exhaustion of a large edition within two years speaks for itself. This fact has offered the author the welcome opportunity of correcting a few errors unavoidable in a first edition of a volume of this size, and of making many additions justified by the very latest contributions to the literature on obstetrics.

**MEDICAL APPLIED ANATOMY.** For Students and Practitioners. By T. B. Johnston, M. B., Ch. B., Lecturer on Anatomy, University College, London, etc. etc. Containing Three Full-Page Plates in Color and 146 Other Illustrations. New York: The Macmillan Company. 1915.

This book deals with the medical rather than the surgical side of clinical anatomy. It is, therefore, particularly concerned with the data of diagnosis rather than with surgical technique, and would seem to be of particular value to the student by fixing his attention upon the importance of anatomical relations. The illustrations are of unusual excellence and add greatly to the book's usefulness.

**DIET FOR CHILDREN.** A Complete System of Nursery Diet with Numerous Recipes. By Louise E. Hogan, Author of "How to Feed Children," etc. etc. Indianapolis: The Bobbs-Merrill Company. 1916. Price, 75 cents.

In this little book, the author has thoroughly covered the question of diet for children, and also tells, in a very concise manner, when to give certain foods in health and illness. A lengthy list of recipes and menus is given. It is a very practical little book to have at hand, and is heartily recommended to mothers, nurses, welfare workers and all who are concerned with the care of children.

**A CAMPAIGN AGAINST CONSUMPTION.** A Collection of Papers Relating to Tuberculosis. By Arthur Ransome, M. D., F. R. C. P., F. R. S., Hon. Fellow of Caius College, Cambridge, etc. etc. Cambridge: At the University Press (G. P. Putnam's Sons, New York). 1915. Price, \$3.25.

In republishing this series of papers, embracing an experience of fifty years in the campaign against tuberculosis, the author deals with many interesting phases of the subject, both social and medical. The book is by no means a complete or even a connected study. It will probably find its greatest usefulness among the social workers and those engaged in public health offices.

**PRACTICAL MATERIA MEDICA AND PRESCRIPTION WRITING.** With Illustrations. By Oscar W. Bethea, M. D., Ph. G., F. C. S., Assistant Professor of Materia Medica and Instructor in Prescription Writing, Tulane University of Louisiana, etc. etc. Philadelphia: F. A. Davis Company. 1915. Price, \$4.00.

The distinguishing feature of Prof. Bethea's book is the inclusion, in the discussion of each drug, of a number of representative prescriptions, illustrating its uses and the best methods of its administration. This is not at all a bad idea and should especially commend the volume to the young practitioner.

**A COMPEND OF MEDICAL CHEMISTRY.** Inorganic and Organic including Urinary Analysis. By Henry Leffmann, A. M., M. D., Professor of Chemistry in The Woman's Medical College of Pennsylvania and in The Wagner Free Institute of Science. Sixth Edition-Revised. Philadelphia: P. Blakiston's Son & Company. Price, \$1.00.

The reviewer can see little else in this compend than a small book in small type. While it may be true, as the author says, that nearly all students use compends, this bare fact is neither a commendation of the student nor of the compend.



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## EDITORIAL.

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### THE WOUNDED STOMACH.

There are times in the course of the life of every human being when he can with impunity imitate the immortal Mr. Pancks who was wont to shovel food into his stomach without the slightest regard as to what the direful outcome would be; but there are also times when this sort of thing is followed by a tempestuous upheaval on the part of the recalcitrant stomach and then great is the astonishment of man. Let us suppose that the human being we have in mind is a poet or a prose writer or a painter, and then let us cogitate as to what sort of poem or prose or painting he would produce after having tortured his stomach as he never would his mind, his muscles, or his lungs. Would he write 'free verse' of the sort that Ezra Pounds has given to the world, or prose in the involved style of James and Meredith, or paint a picture in the manner of the much criticized cubist, Picabia? Or would he wax melancholy over the fact that, though talented, his productions would not be worth while, and on account of his black thoughts turn socialist, aye, even anarchist, and dissipate a talent that was meant for more aesthetic things than the destruction of our present social codes and the burning of buildings?

If all this be true of those gifted sons who have talents that would make the world richer if they only knew how little or how much to eat, how much greater must be the dire effects on lesser men when they, too, regard their stomachs as reservoirs of unlimited capacity. Will a rice diet stay the hand of a man who is in the habit of beating his wife after a very full meal, and put gentleness into his mind and weakness into the muscles of his arms? Will a cabbage regimen be followed by mildness, meekness and generosity in a person who thinks it necessary for him to eat of meat to satiety and to drink of wine when it is red, so as to conserve his

exalted position in the business world as a sort of Scrooge who doles out small salaries to his clerks, small amounts to charities, and niggardly pays his family doctor, but grandly, for ostentatious purposes, the surgeon who is called in to perform an operation?

Professor Maturin is no mean authority on this subject; and though he does not tell us in his book\* that he ever studied medicine, we feel nevertheless that he knows, or rather has thought of some things in connection with food that medical men never touch upon. He may not understand the processes of digestion, but what he does understand is the reason why some men are pessimists and some are optimists, why some men write in a melancholy strain and some in a joyful strain, and why it is that a bright talent soon loses its brightness and sinks into a mere dismal flicker. And just because he has struck a new note in the matter of food, we would acclaim him; and in our enthusiasm we cannot refrain from quoting rather extensively from his chapter on "Food for Thought," just to show our numerous medical writers on the proper digestion of food how little thought they have given in their writings to the benefits that would accrue to a world, always on the alert for talent, if greater heed were paid to what the talented and the untalented should eat, in a quantitative and qualitative sense.

I was just ordering dinner at the Athenaeum when Professor Maturin entered the room and peered about over his spectacles in search of a congenial corner. Happily for me, his glance encountered mine, and his smile accepted my invitation. I settled myself for an hour of rare conversation.

"And what are you planning to have?" he queried. I passed him the order I was signing, but noticed, as he read it, first surprise, then incredulity, and finally sorrow in his expression.

"My friend, my friend," he said, mournfully shaking his head, "and you a literary man!"

"Won't you, then, order for me instead?" I responded, cancelling the slip, outwardly meek, but inwardly rejoicing that my friend's energy had created a situation which his kindness would require him to explain at length.

"In the cause of the advancement of learning, sir, I will!" he replied. And taking a new blank, he began to write from the bottom upward, remarking: "In the first place, I always feel, in order that a dinner may have unity and consistency, it should be planned like a poem, from the end toward the beginning; all the more, since there is no chance for revision. There," he resumed, finishing, "I think that will do, as simple, nourishing, and suggestive."

And he read: "Oysters, with a few Platonic olives, for the sake of Dr. Holmes and criticism; a bit of tenderloin, in memory of Mary Lamb's beefsteak pudding; asparagus, which, according to Charles Lamb, inspires gentle thoughts; cauliflower, which Dr. Johnson preferred to all other flowers; Vergil's salad; apple pie,

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\*The Observations of Professor Maturin. By Clyde Furst. New York: Columbia University Press. 1916.

according to Henry Ward Beecher's recipe, with a bit of Dean Swift's cheese and, finally, a little coffee. I have considerably increased my usual ration in order that you may not miss what the French call 'the sensation of satiety.'

"I find it difficult," sighed Professor Maturin, as he passed the order to an attendant and leaned back in his chair, "to absolve men of letters from what has been called the crime of unintelligent eating. Of all men their need of and their opportunity for wisdom in such matters is the greatest. And yet you have Gray wondering at his ailments and his melancholia, when he was eating chiefly marmalade and pastry, taking no exercise, and dosing himself with tar water and sage tea.

"Shelley did scarcely better in a more enlightened age. Byron's habitual flesh-reducing mixture, potatoes and vinegar, is chemically indigestible. And Thoreau literally consumed himself in following and advocating a diet which so prepared him for tuberculosis that living half his time in the open air could not prevent it.

"The opposite extreme, which is yet more common, is even less attractive in men of genius. Who likes to remember that Spencer and Milton had gout, or that Goethe drank in his time fifty thousand bottles of wine? As for Pepys, what do you think of having one's 'only mayde' dress such a home dinner as this, copied from his 'Diary': 'A fricassee of rabbits and chickens, a leg of mutton, three carps, a side of lamb, a dish of roasted pigeons, four lobsters, three tarts, a lamprey pie, a dish of anchovies, and good wine of several sorts'? No wonder that his better qualities are obscured in our memories of him.

"Philosophers, men of action, and, interestingly enough, men of the world, have usually set a better example. 'They that sup with Plato,' said Aelianus, 'are not sick or out of temper the next day.' Socrates, Epicurus, and Kant, all preached and practiced judgment and restraint. Horace and Catullus insisted that their pampered guests should bring their luxuries with them. Montaigne highly disapproved of elaborate cooking, and Pope refused to dine with Lady Suffolk so late in the day as four.

"Then there is that admirable story of Cincinnatus, whom the venal senators knew they could not bribe after they found him preparing his own dinner of turnips. It is quite in keeping that King Alfred should have burned the cakes, and that Napoleon should have spilled the omelet; and it is to Lady Cromwell's credit that she would not allow the Protector oranges that cost a groat apiece.

"Even aside from health and morals, a man's relation to food is always significant. Who can think of Tasso without remembering that he loved sweetmeats? Is there not literary suggestion in the fact that Vergil loved garlic and Horace hated it; that Horace preferred his Falernian and his Sabine farm to the dinners and Persian apparatus of Maecenas, but that Cicero loved to dine with Lucullus and bought himself a seven-thousand-dollar dinner table?

"Is it not illuminating to know that the favorite food of Burns was oat-cake, that of Byron truffles? DeQuincey's reports that Wordsworth used the same knife for cutting butter and the pages of books; and that Scott, when Wordsworth's guest, repaired secretly to an inn for chops and ale—these are not gossips, but literary criticism. It is as surely interpretative of Dickens to know



that he disliked Italian cookery as that he was fond of playing an accordeon.

"Carlyle's pessimism is usually attributed to indigestion. It ought, I think, to be as usual to explain Emerson's optimism by a digestion that could cope successfully with his favorite pie. We habitually associate tea and coffee with Johnson and Balzac, and their work. Should we not as often remember that Milton produced 'Paradise Lost' on coffee, and 'Paradise Regained' on tea? Of course, such physical criticism of literature must be limited by other judgments. I can well agree with Dr. Gould that many writers show the effects of eye-strain, and it is difficult to upset the diagnosis of anaemia in Hawthorne; but I hesitate to think, with Dr. Conan Doyle, that Shakespeare had locomotor ataxia."

"Why did you associate oysters with criticism?" I inquired, as Professor Maturin paused.

"Do you not recall," he replied, "the Autocrat's remark that literary reputations are largely a matter of administering oysters in the form of suppers, to gentlemen connected with criticism? Veuillot similarly claimed that men were elected to the French Academy chiefly because they gave good dinners. Sydney Smith applied the principle to religion when he said, 'The way to deal with fanatics is not to reason with them, but to ask them to dinner.' On the other hand, Swift used deliberately to test men's tempers by offering them bad wine."

"And did Plato like olives?" I continued.

"He often made a meal of nothing else," was the reply.

"And what was Vergil's salad?" It arrived at that moment.

"It is made of cheese and parsley, with a bit of garlic, rue, and coriander, salt, oil and vinegar. A little of it is, I think, very pleasing. I much prefer it to Sydney Smith's. I never understood how he could write 'Fate cannot harm me, I have dined to-day' about a salad made of potatoes. For the truly esoteric doctrine you must read John Evelyn's 'Discourse of Sallets.'

"Indeed, I am inclined, on the whole, to think that Sydney Smith was what Carlyle called 'a blethering blellum,' when he wrote about food, as he so often did. It was perfectly proper for him to express a desire to experience American canvasbacks, and to be glad that he was not born before tea; but to say that roast pheasant and bread sauce was the source of the most elevated pleasure in life, and that his idea of heaven was eating *pâté de fois gras* to the sound of trumpets—that was both posing and trifling with serious subjects. Charles Lamb's comments on roast pig and frogs' legs, and his kindred table talk, are much more genuine, and, of course, charming; but even they scarcely touch the deeper aspects of the subject.

"Thackeray had all of Lamb's appreciation of food and, I think, something more. He enjoyed his own and accepted others' idiosyncrasies of taste,—witness his treating boys to apricot omelet, which he hated,—but his plea for simpler and more varied dinners, for more hospitality and less ostentation, indicates, I think, that he realized at least something of the profound moral and social significance of food."

P. S.

## ORIGINAL ARTICLES.

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### WEAK FEET. BASED ON THE STUDY OF SEVEN HUNDRED CASES.

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By JACOB GROSSMAN, M. D., of New York,

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During the past several years, many children, the ages of whom ranged between three and five years, have come under my observation at one of the kindergartens of this city. It was rather surprising to see how many of them presented marked eversion of the feet without any apparent discomfort or disability. On examining the shoes of these children I found them to be worn out on the inner side of the soles and heels. There was a distinct prominence on the inner side of the last, on a level of the astragalo-navicular joint. The examination of the feet disclosed an eversion of the heels and the heel cords. There is no question at all that such children, in later life, eventually develop one of the variety of weak feet which we meet with in adults. Symptoms in these cases are lacking until a strain or perhaps an infectious disease starts the ball a-rolling. As the children grow older and their burden in life grows greater, so does the strain on their feet grow greater. Feet which have been sadly neglected in childhood cannot bear the burden as well as feet which have been properly taken care of. It is the neglect of the feet in children, who show an eversion of the heels and heel cords in early life, that predisposes them to suffering and disability in later life.

In order to appreciate the variety of abnormal conditions of the feet in childhood one must be familiar with the normal foot from the time of birth. The foot of the newborn is very delicately formed and its different joints are very flexible. The importance of this will be explained later on. Most conspicuous is the finger-like flexibility of the toes. When a foot is surrounded by a great quantity of fatty tissue it appears to be flat, a condition which has given rise to the contention that all the newborn have flat feet. It has been proved by means of frozen sections of specimens that the osseous structures of the normal arch of the foot are alike in the newborn and in adults. Apparently flatness is produced wholly by the surrounding fatty tissue. When the child becomes thinner, the arch of the foot presents itself immediately after the disappearance of

the fat. This can be demonstrated by making impressions of the sole. Conditions remain stationary during the period of infancy. Later on, with increasing corpulence, the foot apparently again becomes flat.

An exception to this is found in congenital weak feet. Congenital weak foot is sometimes found in combination with club-foot. There is a tendency to pes valgus deformity in a certain percentage of new-born infants. A marked flat foot deformity is not of frequent occurrence. The dorsum of the foot during the embryonic stage is pressed against the leg and retained in that position. The feet of the newborn persist in this attitude of rest for a long time. The foot is dorsiflexed and abducted. This is the exact counterpart to the congenital club-foot. The sole is flat and in some cases convex, and the contours of the bones of the foot are visible under the skin of the sole. The shortened peroneal, dorsal and flexor muscles prevent a correction of this deformity. Correction is much easier than in club-foot, and relapses are less liable to result, although a number of cases which make their appearance later in life must be traced back to a congenital disposition.

Healthy children, when left to themselves, generally begin to creep during the seventh and eighth months. This should be encouraged by all means, because it meets the natural requirements and trains the bones, muscles and joints to bear weight later on.

Where children are taught to stand on their feet too early the untrained muscles, bones and ligaments yield to the overweight, and deformities of the foot are produced, the marked degree of which we call weak feet.

The weight forces the astragalus forward and downward upon the oblique articulating surface of the os calcis, at the same time calling forth an outward rotation of the astragalus. This intended torsion is communicated to the other bones of the foot, resulting in a turning outward of the foot. The inner border of the astragalus endures more weight, the os calcis is turned outward, and we have a weak foot.

Even in a normal foot, the time when a child begins to walk is a critical one. The arch of the foot is distinctly lowered during the first half of the second year. The head of the astragalus and the scaphoid force the fatty tissue downward. With the beginning of the third year the foot becomes strong enough to eliminate the lowering of the arch and the eversion of the foot. Because the period of first corpulence passes at this time, the foot begins to appear more hollow and the impressions of the sole resemble more and more those of adults.

Moreover, it may be stated that in children whose feet are pressed into shoes at an early date, the development of the feet is much slower than in barefooted children. In overfed, heavy children, who





Fig. 1.



Fig. 2.

Fig. 1.—Footprint of a normal child, seven months of age, showing apparent flat feet.  
 Fig. 2.—Footprint of a normal twenty-month child showing apparent flat feet.



Fig. 3.—Footprint of a normal child, four years of age.

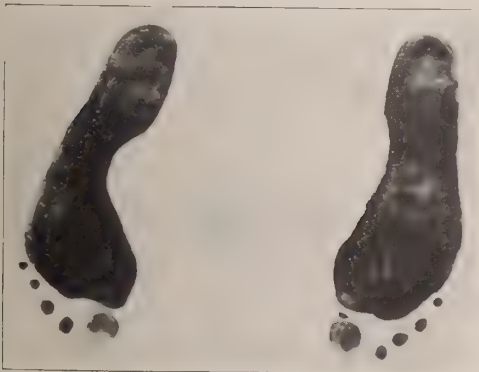


Fig. 4.



Fig. 5.

Fig. 4.—Footprint of a ten-year-old child who has double weak feet. Demonstrates how one can be misled if one depends upon the footprints in making a diagnosis.

Fig. 5.—Footprint of a fifteen-year-old boy who has double weak feet. The interesting feature of this print is that the foot (right), which gave an almost normal footprint, was the one which pained the most. The other foot, which gave quite a flat impression, was free from pain.

are immediately taught to walk or stand on their legs, rachitic tendencies are not even necessary to produce deformities of the feet. Weak feet, the deformity brought on by overweight, is soon noticeable.

*Pathology.*—The foot appears to be turned outward below the ankle, and the axis of the lower leg presents an outward deviation in the plane of the ankle. The internal ankle projects considerably; the arch of the foot alone is not lowered, but in severe cases appears to be convex, the bulging resulting from constant lowering and outward turning of the head of the astragalus and the scaphoid. The inner border of the foot is apparently much longer than the outer.

*Symptomatology.*—The most important symptom is undoubtedly the eversion of the heels and the heel cords. The evidence derived from an impression of the sole fails in children, on account of the fatty tissue, as previously explained.

The gait of such children is awkward. They walk upon the entire sole of the foot. The toes are turned outward and the soles and heels of the shoes are worn away on the inner border. The children tire very quickly, complain of pain and discomfort occasionally, and want to be carried continually.

Such weak feet in childhood are often the beginning of severe deformities later on, such as the weak feet we encounter in adults; these become painful when subjected to an increased strain during adolescence or deficiency of vitality after the fortieth year.

Even in a child a weak foot may develop into a flat foot, which may become a very painful affection.

#### TREATMENT.

*Prophylaxis.*—A great deal can be accomplished by trying as far as possible to follow these very simple suggestions.

1. The feet of small children must not be forced or pressed into shoes.
2. Creeping should be encouraged as much as possible. Infants should be placed upon their abdomen. The desire of locomotion will soon induce the child to become accustomed to creeping.
3. Abnormal locomotion, such as sliding over the floor on the buttocks, develops when children are forced to assume a sitting posture at too early a date, the creeping period being suppressed.
4. The period of creeping must be changed spontaneously by the child into one of walking. Only when a child of its own accord attempts to stand up and walk ahead, holding to some surrounding object, should it be permitted to do so.
5. To force children to walk, either with the aid of a nurse or with go-carts or walking apparatus, is absolutely objectionable. All such appliances and devices of any construction whatever are

impracticable and unnatural. Hastening the commencement of locomotion increases the danger.

6. Children should not be taken on long walks where there is little or no opportunity for them to rest when overcome with fatigue.

7. Regarding the choice of shoes, broad-soled shoes to allow of an unrestricted action of the toes are the best. The muscles of the toes are at the same time the supporting muscles of the foot. The shoes can be made with a slight lift on the inner side of the soles and heels.

Careful attention must be given to the shoes in older children. A child must be given as much opportunity as possible to walk barefooted for the purpose of development of the muscles of the foot.

As soon as abduction occurs, correction becomes necessary. In some cases, especially in those accompanied by genu valgum, the patient seeks to compensate the deformity by walking with the toes turned inward. It would be very wrong to attempt to change this rather ungraceful but certainly not dangerous attitude of the foot. To do so would increase the main trouble.

*Treatment.*—Where a case is seen after the valgus has been present for some time, or where in spite of the prophylactic precautions valgus occurs, proper shoes alone or in conjunction with a support are usually necessary to overcome the condition.

The shoes which we prescribe have a broad sole and are raised one-eighth to one-quarter of an inch on the inner side of the sole and heel. The heel is low and broad. A lace is preferable to a button shoe.

Where the shoe alone does not overcome the deformity, a support is necessary. The support which has proved very satisfactory is the Whitman brace. The method of preparing this brace will be described later on.

In addition, where the child is old enough, exercises should be prescribed. The following exercises are helpful.

1. Walking barefooted.
2. Walking on the front part of the foot.
3. Grasping motions with the toes, exercises with foot weights.
4. Tip-toe exercises.

Last but not least one must not overlook the importance of properly fitting stockings. A stocking must be large enough to allow free muscular action and movement of the toes. A stocking too narrow or too small cramps the toes and interferes with the action of the muscles of the foot, in that way predisposing to the production of weak feet.

In the adult we have to contend with more complicated and difficult types of weak feet. Three types of the weak foot are usually met with.

1. Where there is slight valgus and the arch is of normal depth.



2. Where there is more marked valgus and the arch as a whole has been lowered.

3. Where there is valgus and the arch has disappeared, that is, where the keystone of the arch has broken down.

In our series of 700 cases, the vast majority of them showed one of the above pathological conditions. Lovett,<sup>1</sup> in his paper on flat feet, says that in his series of cases there were no changes in the position of the feet or any change in the arch of the foot in most of them. In our experience we have found an eversion of the heel and heel cords, and a lowering of the arch as a whole, in the vast majority of our cases. There were a few that failed to show eversion, the so-called foot strain, but they were rather the exception than the rule.

Very few of our cases showed shortened calve muscles, the so-called non-deforming club-foot of Schaffer,<sup>2</sup> the contracted foot of Bradford and Lovett,<sup>3</sup> and the muscle-bound foot of Hibbs.<sup>4</sup> In these cases the foot cannot be passively dorsiflexed beyond a right angle, perhaps not so far as that. They cannot wear low heels because of the strain in finishing the step on the sole of the foot, on account of the shortened calve muscles which are primarily pulled on.

There was a very small percentage of our cases that showed a flat arch, showing the insignificant value of foot impressions in making an early diagnosis.

The study of these 700 cases have taught us that every case of flat foot is a weak foot, but every case of weak foot is not a flat foot.

*Etiology.*—Weak foot occurs commonly during the periods of childhood and adolescence. In our series of cases there were 468 cases between the ages of fifteen to forty-five, 232 cases above forty-five and below fifteen.

Females outnumbered males, in the proportion of 2 to 1, there being 495 females, and 205 males.

We have classified our cases as acute, in which the onset was sudden, and chronic, in which the onset was gradual over a long period of time.

The acute cases were usually the result of an inflammatory process, *i. e.*, gonorrhea, rheumatism, etc.; an injury, *i. e.*, Pott's fracture, fracture of the astragalus or os calcis. The latter cases are commonly called traumatic weak feet.

Most of the cases were chronic, the onset being gradual. These occurred in weakly subjects and usually followed a prolonged attack of an infectious disease, *i. e.*, grippe, typhoid, diphtheria and pneumonia. Others were the result of overstrain from a great deal of walking and standing; many of these occurring in policemen, bar-keepers, salespeople, waiters and letter carriers. Still others were



Fig. 6.



Fig. 7.

Fig. 6.—Back view of an average case of weak feet. Note the eversion of the heels and heel cords.

Fig. 7.—Same case as Fig 6, front view. Note the attitude assumed by the feet.



Fig. 8.



Fig. 9.

Fig. 8.—Back view of a case of weak feet, the spastic type.

Fig. 9.—Same case as Fig. 8, front view.

associated with overweight; these usually occurred in obesity and pregnancy.

There were a few in children that were associated with a general muscular relaxation, in which there were also present round shoulders, lordosis and ptoses of the abdominal organs. Rickets with genu valgum was associated with a few of the cases.

In general, any condition which leads to eversion of the foot, throwing the body weight on the inner border of the foot, favors the production of weak feet.

In a large percentage of the cases, poor shoes played a very important rôle in the production of weak feet. An improper shoe restrains the feet from performing their function, thereby weakening the muscles, cramping the forefoot, weakening and narrowing the base of support which the forefoot should afford.

*Pathology.*—The early and moderately advanced cases, types 1 and 2, usually showed eversion of the heels and heel cords and a lowering of the arch as a whole. This eversion varied in degree from a mild to a very marked rolling out of the heels and heel cords.

In the advanced cases, type 3, the head of the astragalus becomes partially dislocated inwards and downwards from the scaphoid, and at times it may only articulate with the latter at the extreme outer part of the head; in consequence, the cartilage disappears from the portion of the bone that is thus exposed and the head forms a marked prominence beneath the skin on the inner border of the foot. The arch of the foot gradually diminishes, until finally the sole is applied flat to the ground. In well-marked cases, the anterior part of the foot becomes abducted, and in very severe cases the inner border of the foot may be convex and the outer concave, so that the patient walks more on the inner side of the foot than on the outer.

In very severe cases the peronei tendons may be dislocated from their groove and lie upon or anterior to the external malleolus. In cases of long standing marked changes also occur in the bones; the uncovered portion of the head of the astragalus becomes enlarged, so that it cannot be replaced in position. Sometimes actual bony ankylosis may take place. There may be effusion into the sheaths behind the tendons and in the tarsal joints.

#### SYMPTOMS.

The symptoms of weak feet rarely depend upon the amount of deformity present; cases with just a slight eversion of the heels and heel cords may suffer severely, and on the other hand cases with a severe pes planus may suffer very mildly.

The *subjective* symptoms are

(a) Pain, present in the vast majority of cases, usually varies from a severe cramp-like, shooting pain to a dull ache. In a num-





Fig. 10.



Fig. 11.

Fig. 10.—Demonstrates the type of strapping employed in weak feet. Side view.

Fig. 11.—Demonstrates the correction of the eversion of weak feet by means of proper shoes.



Fig. 12.

Fig. 12.—Demonstrates the outlines of a Whitman brace.



Fig. 13.

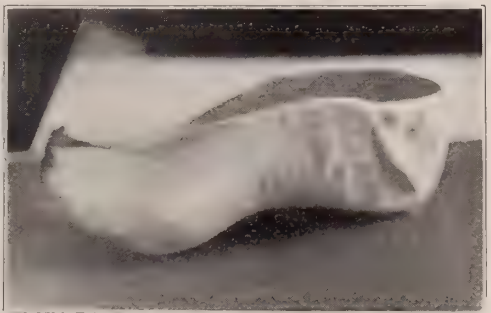


Fig. 14.

Fig. 13.—Shows the under surface of the brace and the outer flange.

Fig. 14.—Shows the mould after the plaster has set and the foot has been removed from it. (Modification of the method advocated by Cheyne and Burghard.)

ber of cases the pain was not referred to the feet alone, but to points distant, *i. e.*, back, hip, knees and thighs and calves. The pain may be unilateral or bilateral; some cases where both feet were weak, the patients complained of unilateral pain. This symptom is usually more marked late in the day after the patient has been on his feet; it disappears at rest and reappears when walking or standing again.

At times one sees cases where the pain is usually localized to the outer side of the ankle; this can be accounted for by the pressure of the os calcis against the external malleolus which occurs from the eversion of the foot.

(b) Another symptom which occurs quite frequently is weakness, discomfort and tired sensation after prolonged standing or walking, usually the result of muscle strain.

(c) Many cases complain of numbness and coldness in the feet. This can be accounted for by the impairment of the circulation which is commonly associated with weak feet.

(d) Limp or staggering gait, especially noticed after sitting or on rising in the morning, resulting from relaxation of the muscular tension when the foot is at rest, is an occasional complaint.

(e) As a result of all these symptoms there may be mental depression and nervous symptoms.

*Objectively.*—(a) The most constant, one can almost say the diagnostic sign of weak foot, present in our series, was eversion of the heels and heel cords. This varied from a very mild to a very marked degree. The only cases which failed to show this sign were those cases of so-called foot strain. These can practically be disregarded as they were few in number in our series.

To determine the amount of eversion present, have the patient stand with his back towards you and observe the deviation of the heels and heel cords, away from the midline of the leg. Another way is to recognize the degree of displacement of the anterior tibial line to the inside of its normal direction.

(b) Some cases are accompanied by a swelling at the outer side of the ankle. This is especially common in fleshy people.

(c) Muscular spasm or rigidity is very common in the advanced cases. The spasm is due to the shortened and contracted muscles on the outer and upper surface of the feet, the result of the persistent attitude of valgus.

(d) Limitation of the range of motion is one of the earliest signs of weak feet. The range of motion varies normally, being greater in childhood than in adults, greater in the slender than in the fleshy foot, and greater in the foot used properly than in one that is not.

Normally the foot can be flexed from 10 to 20° less than the right angle and can be extended from 40 to 50° beyond the right angle, the range of motion being from 50 to 60°. Passively the

range of dorsal flexion is about 5 to 10° beyond that of active flexion; extension is about the same as active extension; adduction is considerably beyond that of active adduction.

Feet which cannot be moved within these limits are said to have limitation of their range of motion. The limitation is caused by the changes in the structure in accommodation to functional use. These changes are at first evident in the muscles and ligaments and later in the articular surfaces of the bone.

*Treatment.*—In considering the treatment of weak feet we usually divide the cases into acute and chronic.

*Acute Cases.*—1. We attempt to arrest the inflammatory condition which is the primary cause of the affection. In the gonorrheal cases treatment of the urethra should be instituted. This usually consists of local irrigations and vaccine therapy.

One must always bear in mind the great tendency to the occurrence of ankylosis after gonorrheal arthritis, hence immobilization should be employed with caution and for short periods only. Begin massage and passive movements early, as soon as the inflammatory process subsides. Adhesions in and about the tarsal joints must be broken down as a preliminary measure.

In articular rheumatism a thorough course of salicylates should be administered. Locally hot fomentations should be applied.

In the traumatic weak foot, proper correction of the deformity and retention with the foot in marked varus will usually overcome any subsequent valgus deformity.

2. Rest in bed with the knee bent and the leg resting upon the outer side are absolutely essential in these cases. Standing and weight bearing should be absolutely prohibited.

As soon as the pain subsides the patient with aid of proper supports, as will be described later on, can leave his bed. The subsequent treatment of these cases is similar to that employed in the early cases of the chronic type.

*Chronic Cases.*—In these cases the onset is gradual and usually extends over a long period of time. We observe three types of these cases. First the early ones, second those that are moderately advanced, and third the rigid type.

1. Early cases: by that is meant where passive motion is painless and free to the normal limit.

The treatment of these cases consists of exercises, usually employed to strengthen the muscles. In those cases convalescing from an acute attack of weak foot, it is a good plan to precede the exercises by the following.

Passive movement should be the first one done. It should be done slowly and to the fullest range of motion possible, pausing at each extreme and returning the foot to the normal position when the motion is finished. The same movement is then performed against



slight resistance offered by the patient, the resistance being gradually increased. The patient then performs the movement himself while the physician guides it along the proper plane. Finally, the movement is done against the resistance of the physician. In this way we can gradually prepare the patients for the more strenuous exercises on their feet.

After this has been practised for some time, the patient is ready to proceed with the subsequent exercises which have proved useful.

1. Tip-toe exercise: the patient places the limbs in the attitude of moderate inward rotation, raises the body on the toes to the extreme limit, the limbs being fully extended at the knees, then sinking slowly, resting the weight on the outer borders of the feet in marked varus, repeating about twenty to thirty times.

2. Rest the weight on the outer borders of the feet in marked varus.

3. Bicycling is an excellent exercise and should be highly recommended in weak feet.

These exercises should be practised twice daily and should not be carried to the extent of tiring the patient.

Proper shoes relieve the muscle strain and also allow free muscular action. A very good shoe should have a broad stiff sole, broad low heel, a rounded toe, a straight last and a lift of an eighth or a quarter of an inch on the inner side of the sole and heel. Our shoes are made by Mr. Max Deutsch of this city and have proved very satisfactory.

As a rule this treatment is all that is required in this type of cases. Where the patient is unable to prevent deformity voluntarily, especially in the weak foot of childhood, a support is necessary to hold the foot in proper position and to relieve the discomfort. In selecting a support for the weak foot, one should remember the nature of the deformity, and that is, that the acquired weak foot is not a direct breaking down of the arch, but a lateral deviation and sinking. Thus a support to be efficient must hold the foot laterally, as well as support the arch. The support which has been found to be very efficient is the Whitman brace. This brace should never be applied to a deformed and rigid foot because it cannot adapt itself to the support; the spasm and rigidity should first be relieved.

The brace is modeled upon a plaster cast of the foot taken whilst the foot is held in the fully corrected position. It fits the arch of the foot accurately, extending forwards almost to the balls of the toes, outwards round the outer border of the foot, and backwards to just in front of the tuberosity of the os calcis. On the inner side it is enlarged upwards and extends well on to the inner side of the foot. With a properly made support, the weight of the foot is not borne upon the apparatus at all, until the arch begins to sink; the foot rests upon its normal bases of support—namely, the under sur-

faces of the heads of the metatarsal bones and the tuberosities of the os calcis, and the brace only comes into action when the arch of the foot sinks unduly. These braces should be accurately fitted and each should be especially made for the individual who has to wear them.

We have at our disposal two methods of taking the cast of the foot. One is that recommended by Whitman and the other is the one recommended by Cheyne Burghard with slight modifications.

The former is taken as follows. The patient is seated in a chair; in front of him is placed another one somewhat less in height; on it is placed a thick pad of cotton batting or a pillow. This batting or pillow is covered with a towel on which talcum powder has been sprinkled. The foot of the patient is then dusted with talcum powder. A quart of cold water is then placed in a basin and plaster of Paris is sprinkled on its surface until it does not readily sink to the bottom; then it is stirred. When the mixture is of the consistency of very thick cream it is poured upon the towel. The patient's knee is then flexed and the outer side of the foot is allowed to sink into the plaster, the borders of the towel being raised, whilst the plaster is pressed against the foot until rather more than half is covered. The foot should be at a right angle to the leg, corresponding to its usual position in the shoe, that is slightly plantar flexed, and the sole should be in the plane perpendicular to the seat of the chair. As soon as the plaster is hard its upper surface is sprinkled with talcum powder and the remainder of the foot is covered with plaster. The two halves are then removed, dusted with powder, bound together and filled with plaster cream. A little later the outer shell may be removed and one has a reproduction of the foot. If properly made this reproduction should stand upright without inclination to one side or the other. If the outer border of the cast is flattened by pressure, a little plaster should be added to approximate the normal rounded contour of the foot.

The other method at our disposal is as follows. The patient sits upon a chair with his foot upon a second chair of the same height. On this chair is placed a small cushion covered with a towel, on which has been sprinkled talcum powder. Plaster of Paris is then mixed with water to form a thick cream; a piece of gauze is then steeped in the plaster of Paris cream and laid upon the towel, underneath the foot, so that the outer border of the sole rests upon it along a line about an inch from one edge. The foot rests on its outer border and is held at right angles with the leg. The gauze is then wrapped around the foot, covering in the heel behind and extending as far forward as the cleft between the toes; it should reach up just above the internal malleolus, but should not overlap the dorsal surface to any extent. This covering is allowed to set and when the plaster is hard there is no difficulty in removing the foot from

it. A fresh plaster cream is now made, the mould is well powdered and the plaster cream is laid in it and arranged so that it fills the mould but does not project beyond it in any direction. When the plaster has set, the sides of the mould are forced aside and the cast is removed and marked for the instrument maker.

This method of making a cast of the foot is very much more simple than that described by Whitman.

The brace is made of thin steel or aluminum alloy and should extend forwards to the line of the metatarso-phalangeal joint of the great toe and backwards to the center of the heel; on the inner side of the foot it extends upwards to one-half an inch below the internal malleolus, and on the outer side grasps the foot just behind the prominence formed by the fifth metatarsal bone. It should be made to fit the cast accurately, except over the heel, where it should be slightly flattened so as to make it steadier.

A badly fitting apparatus extends either too far forwards or too far backwards, and causes so much pain that the patient is unable to wear it; where it fits properly, however, the patient soon becomes accustomed to it and cannot do without it. It should be worn for short periods at first, the length of time being gradually increased as tolerance is established.

The length of time the support is necessary varies with the condition of the patient and the strain to which the feet are subjected. The brace should be corrected from time to time so as to conform with the changes taking place under its use.

Lovett recommends a support consisting of plates of soft steel of graded sizes shaped to the foot of the patient. They have no flanges such as the Whitman brace has. If one bears in mind the nature of the deformity, that is, lateral deviation and sinking, one can readily appreciate of how little value such a support is in the vast majority of weak feet. True, it may prove of value in the so-called cases of foot strain in which eversion of the heels and heel cords may be absent, but these cases do well with a proper shoe alone, so why burden them with extra unnecessary support. Many of our cases have worn supports similar to the one recommended by Lovett, and they complained of having more pain and discomfort; they were more comfortable without them.

An erroneous idea prevails that wearing of the braces results in an atrophy of the muscles of the foot, this atrophy resulting from prolonged pressure of the brace. We have failed to find this atrophy in the cases which we have treated.

Where there is muscular spasm or slight rigidity, where passive motion is painful and not free to the normal limit, the application of (1) stretching either manually or by means of machinery and strapping, usually offers a good deal of relief and assists in over-



coming the spasticity. Stretching should be practised gradually and not too vigorously at first.

(2) Strapping is of special service where the symptoms are acute. The following method, advocated by Cottrell, Gibney and Whitman, has proved very satisfactory.

One end of a strip of adhesive plaster, about 15 in. long and 3 in. wide is applied to the outer side of the ankle just below the external malleolus; the foot is then adducted as far as possible and the plaster is drawn tightly beneath the sole up the inner side of the arch and the leg; it is kept in this position by one or two plaster strips about the calf. Narrow strips are then applied about the arch and ankle in a figure-of-eight manner. Strapping should be done twice a week, and continued until the spasm and slight rigidity have been overcome. When this has been accomplished the brace and proper shoes should then be prescribed.

*Rigid Weak Foot.*—Where there is marked rigidity and deformity, forcible overcorrection under anesthesia is the best method of treatment at our disposal. In this type of weak foot, the foot is held rigidly in the deformed position by muscular spasm and by secondary changes in its structure. The deformity is usually a dislocation in which the astragalus has slipped downward and inward into a position of valgus, the remainder of the foot being turned outwards.

The patient should be placed under an anesthetic, the foot is then manipulated in all directions so as to break down any adhesions that may be present. The inner side of the foot should be fixed, and the abduction of the front half of the foot is forcibly overcorrected. This often calls for exercise of considerable force. After this has been done the foot should be put up in plaster of Paris bandages with the deformity overcorrected. It is well to renew the plaster of Paris bandages every ten days as they are apt to become loose. In these intervals massage and passive movements in all directions should be practised. The plaster of Paris bandages should be retained for about four weeks, when they are to be removed and measurement for a pair of braces taken. The bandages should be reapplied until the braces are ready, when they can be discontinued. Systematic manipulation should then follow until passive motion is free and painless. This is usually accomplished within a month.

Where the parts cannot be brought into position by forcible manipulation, where the bony deformity is extreme and pain and disability great, some form of operative procedure becomes necessary. The common operations performed are

(a) Excision of the head of the astragalus. This has proved satisfactory in some cases.

(b) The production of bony ankylosis, between the scaphoid

and astragalus (Ogsten's operation), improves the condition of some patients.

(c) The removal of a wedge-shaped portion of tarsus, the base of the wedge being on the inner side of the foot and the apex at the outer, has proved useful in some cases.

(d) Achillotomy followed by proper after-measures has been done in those cases in which the Achilles tendon was found to be contracted.

#### ANALYSIS OF SEVEN HUNDRED CASES OF WEAK FEET.

##### SEX:

Female .....	495	70 5/7 per cent.
Male .....	205	29 2/7 per cent.

##### AGE:

15 to 45.....	468	66 6/7 per cent.
Below 15 and above 45.....	232	33 1/7 per cent.

##### DURATION OF SYMPTOMS AT FIRST VISIT:

1 day to 1 month.....	150	21 3/7 per cent.
1 month to 1 year.....	488	69 5/7 per cent.
More than a year.....	62	8 6/7 per cent.

##### PAIN:

There were 587 or 83 6/7 per cent. who complained of pain as follows:

Feet and calves.....	358	51 1/7 per cent.
Calves .....	47	6 5/7 per cent.
Lower extremity .....	68	9 5/7 per cent.
Back and thighs.....	35	5 per cent.
Ankles .....	40	5 5/7 per cent.
Knees .....	39	5 4/7 per cent.

One extremity where both were weak:

There were .....	156	22 2/7 per cent.
Right .....	72	10 2/7 per cent.
Left .....	84	12 per cent.

##### DID NOT COMPLAIN OF PAIN:

There were 113 or 16 1/7 per cent. who came with other complaints as follows:

Tired easily .....	27	3 6/7 per cent.
Limped .....	8	1 1/7 per cent.
Injury .....	14	2 per cent.
Ankles turned .....	23	3 2/7 per cent.
General muscular relaxation.....	6	6/7 per cent.
Sent as spine cases from school..	5	5/7 per cent.
Numbness .....	1	1/7 per cent.
Intoeing .....	3	3/7 per cent.
Swelling about the ankle.....	26	3 5/7 per cent.

##### OBJECTIVELY:

Eversion of the feet.....	700	100 per cent.
Swelling .....	56	8 per cent.
Spasm or stiffness.....	41	5 6/7 per cent.

## REMARKS:

Associated with articular rheumatism .....	16	2 2/7 per cent.
Treated as rheumatism.....	70	10 per cent.
Associated with pregnancy.....	7	1 per cent.

## SUMMARY AND CONCLUSIONS.

1. The importance of treating weak feet of childhood, so as to obviate suffering and disability in later life, should not be underestimated.

2. One must always bear in mind that all feet in infancy and early childhood appear flat but are not flat.

3. Many cases of weak feet exist in childhood which do not present any subjective symptoms. These cases should be treated, nevertheless, as it will be just a question of time when they will produce symptoms.

4. Allowing the creeping and walking periods to occur spontaneously, and not forcing them, is very important as a preventive measure.

5. The importance of proper footwear and stockings should always be kept in mind.

6. In cases where indefinite pain is complained of, especially where local manifestations are absent, one should always eliminate the presence of weak feet.

7. Very few cases show a distinct flat foot or pes planus, showing how one can be misled in the diagnosis when one depends upon a flat foot impression.

8. Eversion of the heels and heel cords is the most constant sign present.

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## RECURRENT DISLOCATION OF THE SHOULDER.

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Since dislocations of the shoulder are frequently not completely reduced and are followed by chronic deformity or recurrence, they logically fall into the hands of the orthopedic surgeon. In the present article only dislocations of this character will be considered, since traumatic dislocations, at the time of their occurrence, naturally belong to the domain of general surgery.

## ANATOMIC DATA.

The shoulder-joint is a true ball and socket joint, the large globular head of the humerus and the shallow glenoid cavity permitting of considerable range of movement. The joint is protected by atmospheric pressure as well as by numerous tendons that surround it, but the joint surfaces are not held in apposition by the ligaments, their use being to limit principally the amount and range of movement.

The joint is protected above by an arching vault, formed by the acromion process, the coracoid process, supplemented by the coraco-acromial ligament. The capsule that invests the joint is loose and apparently insufficient. It is made up of bands of closely interwoven straight and oblique fibers, strengthened by a few strong circular fibers. It is intimately united with the coracohumeral ligament, which adds great strength to its upper portion. Additional support is found in three accessory glenohumeral bands, arising in the interior of the joint. One of these finds attachment to the lower part of the lesser tuberosity of the humerus, another to the under part of the neck of the humerus, and a third passes down along the inner edge of the tendon of the biceps, below the lesser tuberosity of the humerus, where it forms the inner boundary of the upper part of the bicipital groove. The transverse humeral ligament is a prolongation of the capsular, and is a broad band of fibrous tissue passing from the lesser to the greater tuberosity, while the glenoid ligament is a fibrocartilaginous plate that is attached around the margin of the glenoid cavity, deepens the cavity for articulation, and protects the edges of the bone.

Two of the largest and most important muscles concerned in

recurrent dislocation are the pectoralis major and the latissimus dorsi. By their joint action and broad and wide attachment they influence the tendency to upward dislocation, but the writer thinks it possible to dislocate the joint downwards, as when the ligaments and capsule have been weakened, stretched, or ruptured by previous injury.

The nerves which supply the muscles, fascia and skin about the shoulder-joint are the same nerves going to the supply of the joint; so if the joint is injured or inflamed the muscles are held rigid, to protect the parts from injury and the part is maintained in the most comfortable position.

#### ETIOLOGY AND PATHOLOGY.

Dislocations of the shoulder are usually due to extreme violence applied directly to the shoulder, or when the arm is thrown out in a position of extreme abduction, a smaller number being due to an upward thrust of the humerus from falls on the elbows or hands. Muscular subjects are more prone to dislocations of the shoulder than are those of weak musculature. For this reason, men suffer the accident, especially because of occupation, much more commonly than women, in the ratio of 4 or 5:1.

In extreme abduction the humerus is the lever, the tip of the acromion the fulcrum, the humeral head tearing the loose capsule below. The capsule is normally always thin; in these dislocations it is extensively torn, the rent being found at the inferior and anterior part of the joint in front of the long head of the triceps. The position of the latter impedes the downward course of the head of the humerus, tending to force it forward, up under the coracoid process; hence, the frequency of subcoracoid dislocations. Again, the coracohumeral ligament by its strength, determines a large majority of dislocations of the shoulder, and again for this reason the subcoracoid is the most common form, because upward dislocation of the shoulder is prevented by the situation of the following unyielding structures, *i. e.*, the acromion, the coracoid process and the coraco-acromial ligament.

But occasionally, muscular action alone may suffice to produce a shoulder dislocation, the arm being placed at a disadvantage, by a swinging blow or in throwing.

As has been previously remarked, the capsule is usually torn at its lower part; but the violence may not only result in the avulsion of the capsule, but serious damage may be inflicted upon surrounding soft parts and bone, including muscles, which may be torn from attachments with small laminae of bone; in rarer cases the greater tuberosity may be torn away from the humerus, and in still rarer instances even the smaller tuberosity may suffer a detachment. There is not infrequent injury to the circumflex

nerve, as this structure is especially exposed to violence as it passes around the neck of the humerus, from behind forward on a level with the junction of the upper and middle thirds of the deltoid, and the deltoid itself, being put on a stretch, prevents the apposition of the elbow to the site of the body.

#### CLINICAL VARIETIES.

It would be irrelevant to attempt any discussion of the clinical varieties of dislocation in a brief exposition such as this; but for the sake of completeness and unity of subject, we may for the moment recognize the following forms:—

1. *The Congenital.*—The condition is rather a rare one. The larger number of cases are of the subspinous variety, with the arm usually in abduction and rotated inward; with limitation of movement and atrophy of the shoulder muscles. Many cases of so-called obstetric paralysis are originally dislocations that have remained unreduced.

2. *The Paralytic.*—These are usually due to infantile spinal palsy and to other paralytic conditions, and in which the deltoid suffers more than any other muscle; and in addition to loss of rotundity of the shoulder and prominence of the acromion process, attempts to use the arm are frequently followed by dislocation.

3. *Pathologic.*—This is due to disease of the shoulder-joint and particularly of the glenoid cavity. In this dislocation a similar condition of the deltoid is encountered, and after atrophy of the head of the humerus occurs, the proximal end of the shaft may be drawn upward producing a subcoracoid dislocation.

4. *The Recurrent.*—This condition is not of rare occurrence and is characterized by structural changes in the articulating surfaces or capsule of the joint. Conditions favoring recurrences of dislocation of the shoulder include (1) large tears in the capsule, most frequently located in the anterior or internal aspect, permitting the removal of the head of the humerus from the glenoid cavity; (2) a lax condition of the capsule proper, or a free communication between the joint and the subscapular bursa; (3) fracture on the inner edge of the glenoid cavity, reducing the depth of the cavity; (4) muscular atrophy on the affected side; (5) rupture of the external rotators of the humerus, or avulsion of the greater tuberosity.

One of the cardinal signs of recurrent dislocation is impairment of function. Those vocations that bring into play constant abduction of the arm strongly predispose to the recurrences. Again, the vast majority of these dislocations are dependent upon a tear in the anterior and lower portion of the capsule, the posterior part of the capsule remaining intact.

Following the primary dislocation there may be an interval of



many weeks or months elapsing, before recurrence again appears, when suddenly, perhaps, the arm is thrown in a certain position and luxation again occurs.

The deformity is so characteristic as to be readily recognized, even without removing the clothing. The head is inclined toward the affected side, the arm appears lengthened and abducted from



Fig. 1.—Recurrent (subcoracoid) dislocation of the right shoulder-joint, before operation.

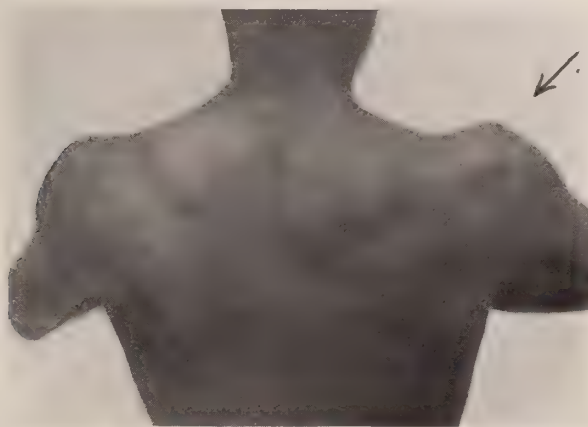


Fig. 2.—Same, posterior view—before operation.

the chest wall. The acromion appears prominent and the deltoid sunken, giving a depressed appearance to the arm at its attachment; and there is a rounded eminence beneath the coracoid process (Figs 1 and 2). These symptoms disappear when the shoulder is replaced, and reappear upon its recurrence.

In association with the foregoing symptoms, mention must be made of the possible occurrence of a perineuritis and a neuritis as

a complication in the subject under review. The theory of a redicular paralysis, *i. e.*, of the roots of a plexus, is admitted. This paralysis is most frequently due to injury about the shoulder; and investigators divide the cases into those due to lesions of the roots of the plexus itself and those due to lesions of the terminal branches of the plexus.

#### TREATMENT.

In the treatment of recurrent or habitual dislocation of the shoulder, different operators vary in their technique and in the choice



Fig. 3.—Same case, after operation—showing line of incision.

of operation. The profession is largely indebted to Dr. Oscar H. Allis, of Philadelphia, for some excellent hints and suggestions that have emanated from his pen, relative to the studies of dislocations in general, and especially to luxations of the hip and shoulder-joints. Many surgeons prefer an operation upon the capsule, such as advocated by Burrell, T. Turner Thomas, Jones and others. The operations of Thomas are directed toward the torn capsule and the division of bands and adhesions. Burrell operates with a view to plicate the capsule, to shorten it and diminish it.

The writer's operation, suggested by Allis, has for its object an entirely different purpose; it is intended to change the leverage of the two most powerful muscles which are acting as a dislocating force.

As long as the capsule and ligaments are strong, these muscles will not be able to displace the head of the bone, but after displacement once occurs, the stretched and torn capsule and ligaments readily allow the shoulder muscles to dislocate the shoulder-joint upward.

In order to change the leverage of the muscles, as above indicated, I have at different times performed the operation upon the cadaver, first locating the pectoralis major muscle and dividing its lower portion. The long tendon of the biceps is displaced inward, the broad flat tendon of the latissimus is hooked up, the insertion of the tendon is exposed, and the lower half divided.

In the living subject it is expedient to make an incision over the space between the deltoid and the pectoralis major muscles, exposing the bicipital groove and displacing outward the cephalic vein (Fig. 3). The broad attachment of the pectoralis major is divided at its lower half. In a muscular subject it is impossible to hook up the latissimus muscle from the front, so a second incision is made along the posterior border of the axilla, over the latissimus muscle, exposing its deep broad attachment to the posterior ridge of the bicipital groove. Its lower half is now divided in the same manner as the former division of the pectoralis major. The deltoid and pectoralis major are then brought together with deep catgut sutures and the skin with a continuous suture, and the arm is maintained in an extended position, for a couple of weeks, upon a triangular splint. For one week after the operation the shoulder is kept elevated on the triangular splint so as to prevent the union of the divided extremities with tendons. One advantage in this operation is that the capsule is not opened and there is, therefore, less danger of infection of the joint. This gives the operation a decided advantage over all other operative procedures. Recovery follows promptly the performance of the operation, and there is no loss of power in the arm from division of the lower half of these two important tendons.



## TREATMENT OF DEVASCULARIZED INTESTINE. AN EXPERIMENTAL STUDY.

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The usual surgical practice, in the presence of perforating wounds at the junction of the mesentery and the bowel, is resection of the segment of intestine involved. This procedure is based upon data, gained from pathologic study and surgical experience, which indicate that, for practical purposes, the arteriæ rectæ passing to the intestine from the parallel vessels of Dwight are end arteries; that while, anatomically, anastomoses between adjacent vessels may be demonstrable, they cannot be depended upon to maintain an efficient blood supply in case the artery to a particular segment suddenly becomes occluded. Recently published results from experimental laboratories do not appear to be in harmony with these generalizations. It is reported that segments of intestine (ileum near ileocecal junction) several inches in length may be devascularized by ligation of the mesenteric vessels at the border of the bowel without impairment of function, especially if the devascularized segments are protected by a wrapping of omentum. In regard to this Horsley and Coleman<sup>1</sup> say: "It has usually been taught that if a bowel is deprived of its nutrition from the mesentery even for a short distance, a resection should be done. These experiments demonstrate that, in the dog at least, a loop of 4 or 5 in. of intestine may be deprived of its blood supply through the mesentery and may still survive if omentum is wrapped around it and fastened in position. In long abdominal operations where for some reason the mesentery has been severed from the bowel and the patient's condition does not admit of a resection, it appears justifiable to wrap the omentum around this portion of the bowel and stitch it to itself and the intestine with a reasonable expectation that the segment will be properly nourished through the omentum." Azara<sup>2</sup> concludes from experiments on fourteen dogs that separation of the mesentery over a stretch of 5 cm. along the margin of the bowel does not compromise it beyond repair, and that up to this distance, therefore, treatment may be conservative. With separation over a stretch of 6 cm., the function of the intestine is so seriously compromised that resection is required unless there is a strip of mesentery at least 1 cm. wide still attached to the intestine. Devascularization of a segment of intestine 18 or more centimeters in length,

even though the mesentery be preserved for a distance of 3 cm. from the bowel, entails inevitable gangrene. Ligation of the vessels supplying segments of bowel not exceeding a length of 15 cm. at a distance of 3 cm. from the intestine is never followed by gangrene, but occasionally functional disturbances are caused by the development of cicatrix. According to Scandola<sup>3</sup> interference with the blood supply of a loop of intestine affects the mucosa primarily. Whenever the injury to the intestine is limited to the mucosa, complete recovery is the rule. Quite serious changes in the mucosa may retrögress, but pronounced alterations in the outer layers inevitably prove fatal. Complete restitution may occur in a loop of intestine the blood supply to which has been interrupted for six hours.

In view of this apparent discrepancy between the results of clinical experience and those of recent experimental study the present investigation was undertaken.

#### EXPERIMENTAL DATA.

Series I.—Five dogs. Segments of lower end of ileum ranging in length from 3 to 8 in. were used. Omentum was not wrapped about segments. In every case the bowel lived and functionated. *Protocol of typical experiment No. 73.*—August 12th, 1914. Ether anesthesia. Terminal 8 in. of ileum devascularized by multiple contiguous ligatures at mesenteric border of gut and by ligature of main trunk to segment. Mesentery divided for the entire length of the segment just proximal to first set of ligatures; edges of leaves of mesentery united by continuous over and over stitch of catgut around entire margin of cut, controlling slight oozing; edges of hole in mesentery approximated partially by single catgut stitch; active peristalsis appeared in portion of gut devascularized and parts of it became grayish in color.

September 14th, 1914. Dog in fine condition. Etherized. *Post-mortem findings.*—Fibrous adhesions uniting limbs of terminal loop of ileum; omentum adherent to segment at several points. Mesentery reunited to gut all along segment with very slight trace of cut made a month previously. Mucosa of affected segment normal.

Series II.—Eight dogs. After devascularizing segments of bowel as in Series I the large recurrent vessel from the cecum—neglected by Horsley and Coleman—running along the antimesenteric border of the terminal 6 or 8 in. of ileum, was ligated at each end of the segment in some of the animals. In others, the same end was attained by devascularizing the segment just cephalad to the termination of the recurrent vessels. In three of the dogs three separate segments of bowel were devascularized. With but two exceptions, each segment was made approximately 3 in. in length. Six of the segments were wrapped in omentum; of these, one became gangrenous leading to death of the animal in forty-eight

hours; one became the seat of acute (see protocol of dog No. 76) and one of chronic (see protocol of dog No. 99) intestinal obstruction, each fatal; two lived and functionated; one became the seat of marked changes and was apparently on the verge of disintegration when the animal died of sepsis (?) (see protocol of dog No. 79). Four of the segments were not wrapped in omentum. Of these, two became gangrenous with resultant death of the animals in forty-eight hours; two lived and functionated.

*Protocol of dog No. 76.*—August 25th, 1914. Three inches of ileum just cephalad to the termination of the anastomosing branch from the cecum on antimesenteric border of bowel was devascularized as above and wrapped in omentum. There was marked, persistent contraction of devascularized segment which became slate colored.

September 6th, 1914. Found dead. *Post-mortem findings.*—Intestinal obstruction at site of operation by contracting omentum and inflammatory exudate. Mucosa necrotic for space completely encircling bowel and  $1\frac{1}{2}$  in. in width at middle of segment. General peritoneal cavity clear; no local abscess.

*Note.*—Dog had bloody diarrhea for several days preceding death.

*Protocol of dog No. 99.*—Operation on February 20th, 1915. Ether anesthesia. Segment No. I,  $3\frac{1}{2}$  in. in length, devascularized in usual manner. Segment immediately became blue with occasional transverse whitish streaks and was tonically contracted.

Segment No. II, 6 in. cephalad, devascularized in a similar way. This segment was but  $\frac{1}{2}$  in. in length; same changes were observed here as in preceding segment.

Segment No. III, devascularized in a manner similar to No. I with the addition that the large vessels supplying the segment were doubly ligated and divided between the ligatures; mesentery divided at the same point; omentum wrapped around segment and anchored by a few interrupted catgut stitches.

Segments Nos. I and III became slate colored and flaccid; segment No. II rapidly began to regain normal color.

February 23rd, 1915. Dog in fine condition.

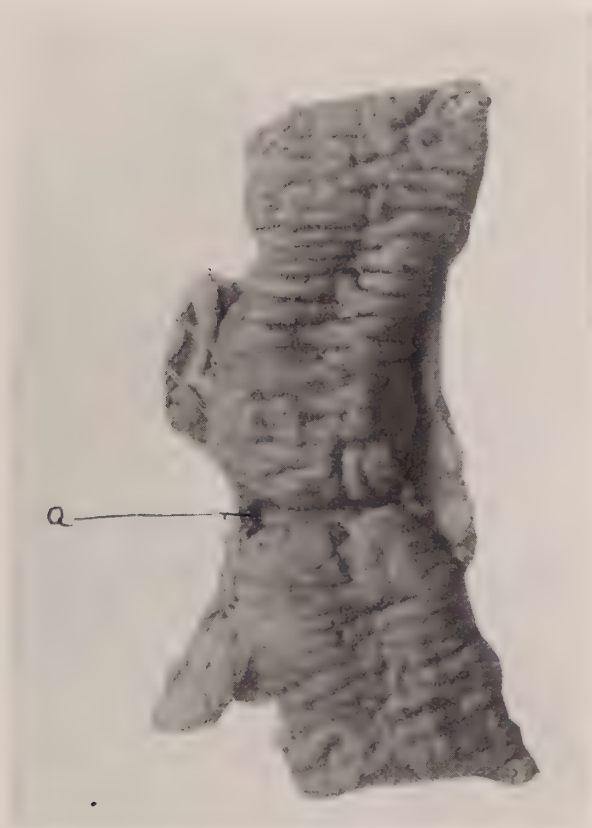
March 23rd, 1915. Dog much emaciated, very weak, apparently dying. Etherized. *Post-mortem examination.*—Intestinal obstruction due to large hair ball; lumen of bowel just distal to hair ball was reduced to a diameter of about  $\frac{1}{3}$  in. by dense encircling band of scar tissue  $\frac{1}{2}$  in. in width and devoid of mucosa (see Fig.). On the peritoneal side a few tags of adhesion extended between omentum and site of the constriction which was in the position of segment No. III. The other two operative sites were not demonstrable.

*Protocol of dog No. 79.*—August 25th, 1914. Operation similar to that of dog No. 76. General condition before operation bad.



August 29th, 1914. Died. Post-mortem examination immediately after death. General peritoneal cavity clean. Omentum adherent to devascularized segment of bowel by fibrinous adhesions which are easily separated; bowel wall—peritoneal side—greenish black with admixture of red, but no visible ulceration excepting at points along mesenteric border where ligatures were placed close to the bowel,—here there are local ulcerations extending down to submucosa.

Microscopically, there is marked hemorrhagic infiltration of all



Site of constriction ('a').

the coats of this portion of the bowel, veins and capillaries are widely dilated; there are occasional intravascular fibrin masses with a few leucocytes in the meshes—no marked accumulations. These changes are especially marked in the submucosa.

Series III.—Four dogs. In addition to the steps of the operations of Series II olive oil was injected into the vessels supplying the middle portion of each segment devascularized, with the intention of producing fat embolism. These segments were about 2 in.

in length. The injection was made by vein into three of the segments, and by artery into five. One of the former and two of the latter segments became gangrenous; the remaining segments did not suffer injury sufficient to produce symptoms. The difficulty in producing fat embolism seemed to lie in the abundance of the longitudinal collaterals in the intestinal wall. During most of the injections fat droplets could be seen gaining an outlet from the devascularized area through these vessels. An illustrative protocol follows:—

*Dog No. 98.*—February 16th, 1915. One segment of bowel about a foot proximal to the ileocecal junction devascularized with the exception of its middle inch. Here the veins were ligated but the arteries were not interfered with. A second and a third segment, proximal to the first, was devascularized and olive oil (XXX) injected intra-arterially into the middle of each.

February 19th, 1915. Dog dead twenty-four hours. Post-mortem changes marked. General peritonitis. Segment I is somewhat dilated, flabby, with hemorrhagic areas in the mucous membrane but no ulceration. Mucous, muscular and peritoneal lesions are about co-extensive in segments II and III; the line of demarcation between normal and pathologic tissue tends to be much more sharply marked on the mucous membrane than elsewhere; segments II and III literally melt away like wet tissue paper on the slightest manipulation.

*Series IV.*—Fourteen dogs. After placing multiple contiguous ligatures close to the bowel as in the preceding experiments the leaves of the mesentery were cut distal to the ligatures; by this means the straight and encircling branches of the arteriæ rectæ were divided and the ‘uncovered’ portion of the intestines exposed. In order to control slight oozing from the severed vessels a continuous catgut suture was so placed that the edges of the peritoneum on the bowel were approximated and the “uncovered” portion buried. In all probability this suture interfered with the circulation not only in the neighborhood of its location, but to some extent in the entire circumference of the segment.

In five experiments the length of the devascularized segment was between 1 and 1½ inches. In four such instances the segment continued to functionate. Autopsy disclosed, after intervals of two days to three weeks, relatively unimportant injury (local hemorrhages into the mucosa at the mesenteric border). The protocol of one case in which marked changes were found follows:—

*Dog No. 111.*—March 19th, 1915. Devascularization of one inch of small intestine—ileum. Ether anesthesia.

March 26th, 1915. Dog found dead. Autopsy revealed bilateral pneumonia. The lumen of the intestine at the site of the devascularization was reduced in diameter to about 5 mm. by an encircling

fibrous and fibrinous ring; there were a few areas of hemorrhagic infiltration in the underlying mucosa; no peritonitis; no adhesions.

In four experiments 3 in. of intestine were devascularized. The results were as follows: Gangrene and general peritonitis following leakage through dense adhesions in one case; marked diminution in diameter of intestine in the second (see protocol No. 104); one animal died of pneumonia in three days; there was no macroscopic evidence of general peritonitis and no adhesions; the loop devascularized was purplish in color and the overlying peritoneum was slightly roughened; the mucosa was necrotic. At the site of the fourth segment seen at autopsy four months after operation, omentum was adherent over an encircling band about 3 mm. wide; a fibrous ring was palpable beneath the adhesions; on section this ring appeared to occupy the entire space between the mucosa, which was intact, and the adhesions; the diameter of the bowel at this point was reduced by about one-half (dog No. 115).

*Protocol of experiment No. 104.*—February 25th, 1915. Three inches of intestine devascularized.

March 15th, 1915. Dog much emaciated. Killed with ether. There are marked adhesions of omentum about the site of operation. The wall of the intestine at this place appears to have been replaced by an encircling band of dense scar tissue 1.5 cm. in width which is devoid of mucosa. The diameter of the lumen of the bowel here is about 8 mm.

In five experiments the length of the devascularized loop was about 4 inches. General peritonitis following leakage through dense adhesion about necrotic bowel caused death in three of the animals after intervals varying from three days to one week. The fourth animal when etherized two months and a half after operation presented findings similar to those described in dog No. 115. The fifth dog of this group died in five days. At autopsy no adequate explanation for the death of the animal was found. The affected segment was wrapped in adhesions; there was no perforation though the intestinal wall was the site of marked hemorrhagic infiltration.

Summarizing the results of these experiments it appears that in normal dogs a loop of small intestine one inch in length may be completely separated from its mesenteric blood supply with relative safety, although gangrene with perforation and general peritonitis may occur and replacement fibrosis of the devascularized segment with consequent narrowing of the bowel lumen may occasionally be expected. The frequency of one or the other of the above accidents increases rapidly as the length of the devascularized segment is increased, until, at a segment length of 4 in., gangrene with complete destruction of the involved loop or replacement fibrosis with contraction becomes the rule.



Wrapping omentum about devascularized bowel appears to influence the final result but little; certainly not enough to justify the confident assertion of Horsley and Coleman whose error and the reason therefore has been demonstrated by the results of the experiments in Series I and II of this paper. The value of omentum in walling off inflammatory foci is universally acknowledged, and the abundant vascular channels which may develop in omental adhesions justifies the Talma operation; but neither of these conceptions may be applied with safety to the conditions now under discussion. Gangrene is not an inflammatory process; it is characterized by the absence of inflammatory reaction in the tissues directly involved. Such tissues die. The fate of a segment of intestine suddenly deprived of its mesenteric blood supply depends entirely on the size, number and patency of its intramural collaterals, for the changes following devascularization occur so rapidly that there is no time for vicarious revascularization through fresh adhesions. If a devascularized portion of intestine becomes gangrenous just after it has been wrapped in omentum, the intestinal contents are poured directly into the enclosing omentum and the resultant peritonitis is only a matter of minutes. If the mucosa only is involved, restitution may occur independently of enclosing omentum, though, if the defect is large, cicatricial contraction may be marked. The deeper the defect in the intestinal wall the more imminent is perforation, or failing the latter, cicatrix with contraction. Omentum wrapped about devascularized intestine cannot avert gangrene in the slightest, and, should gangrene occur, it may prove efficient if the gangrenous area is small in extent, but it cannot be depended upon to confine the intestinal contents and prevent peritonitis.

Among the factors, which may cause variation in the results of the separation of equilinear segments of intestine from their mesenteric blood supply, may be mentioned at least four. First, the quantity of normal intramural channels: thus injury at the upper end of the jejunum should offer a better prognosis from the standpoint of the maintenance of the integrity of the bowel than similar injury at a point low down in the less vascular ileum; second, the elasticity of the intramural channels: gangrene might be expected to occur in individuals with arteriosclerosis more commonly than in those not thus afflicted; third, the circulatory pressure: patients in shock from loss of blood or other cause, or who are suffering from some wasting disease, such as typhoid fever, offer a less favorable prognosis than individuals who, excepting for the lesion at the mesenteric border, are normal; fourth, and probably most important, is the factor of thrombosis and especially septic thrombosis since septic thrombi frequently become propagating thrombi. No matter what the number or elasticity of the intramural vessels and regardless of circu-

latory pressure, thrombosis will insure complete devascularization and therefore gangrene wherever it involves any appreciable extent of intestine.

#### CONCLUSIONS.

1. Segments of small intestine which have become separated from the mesenteric blood supply for a distance of 4 in. or more demand resection. Shorter segments may be treated conservatively though the risk is great and a fairly safe rule would be to resect all devascularized segments which exceed one inch in length. Segments less than an inch in length will rarely require resection, although there is a definite risk in non-interference.

2. To depend upon omentum to maintain the vitality of devascularized loops of bowel is to invite disaster.

3. Dangers associated with the conservative treatment of devascularized segments are:—

- (a) Gangrene with perforation and peritonitis, or
- (b) Intestinal obstruction by contracting scar tissue.

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<sup>1</sup> Horsley and Coleman (*Annals of Sur.*, 1913, Vol. LVII, p. 506).

<sup>2</sup> Azara (*Policlinico*, Rome, 1914, Vol. XXI, p. 309, Surgical Section, No. 7; *Abs. Jour. Amer. Med. Assoc.*, 1914, Vol. LXIII, p. 980).

<sup>3</sup> Scandola (See *Abst. Jour. Amer. Med. Assoc.*, 1915, Vol. LXIV, p. 2029).

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CHOICE OF OPERATION IN THE CURE OF ANEURYSMS  
OF THE EXTREMITY.

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In most surgical conditions, the operative plan is dependent to a great extent on the diagnosis or to put it in another way, once a definite diagnosis is established a self-evident operative mode of procedure becomes apparent. Even when the diagnosis is in doubt, conditions are such in this day that the surgeon enters upon his work prepared for any eventuality. For example, given an obscure abdominal mass there are definite lines along which he will proceed depending almost entirely on its character after exposure—if an abscess, drainage is indicated; if a growth, removal when possible; if an obstructed, gangrenous gut, resection followed by anastomosis if the patient's condition permits of it, etc. etc.

Unfortunately, a similar state of affairs is not encountered in certain special conditions notable among which is that connected with the cure of aneurysms. And I dare say not one surgeon in a hundred undertakes an operation of this character with the same preparedness for eventualities that the entire hundred would exercise in operations of a so-called 'general character.' The explanation is twofold; not one surgeon in a hundred is equipped for 'any eventuality' in this work either by training or as regards the necessary instruments, nor is due consideration commonly accorded that feature of aneurysms of the extremity which is most important of all factors in determining an operative plan. I refer to the *collateral circulation*.

It is quite simple in the vast majority of cases to diagnose an extremity aneurysm, and it is equally elementary to say, "Well, I'll just excise this thing" or "I'll just try out the Matas endoaneurysmorrhaphy" or "I'll just do this or that." Furthermore, it is not so difficult to carry out any one of these procedures. It *is* difficult, though, to determine just which one of these or other operations is best suited to the case in hand. In fact, I know of nothing more trying, exasperating and at times more unsatisfactory than carrying out the tests necessary to a careful study of the collateral circulation, accurate knowledge of which alone can point out the operation to be chosen.

Matas, of Tulane University, has considered this subject in several noteworthy publications, in two of which are to be found de-



tailed accounts of those tests\* upon which most reliance\*\* can be placed. Most of them are hard to carry out and are rather inconclusive, but a modification of that one devised by Moszkowicz, of Vienna, does seem to give quite accurate readings if carefully ap-

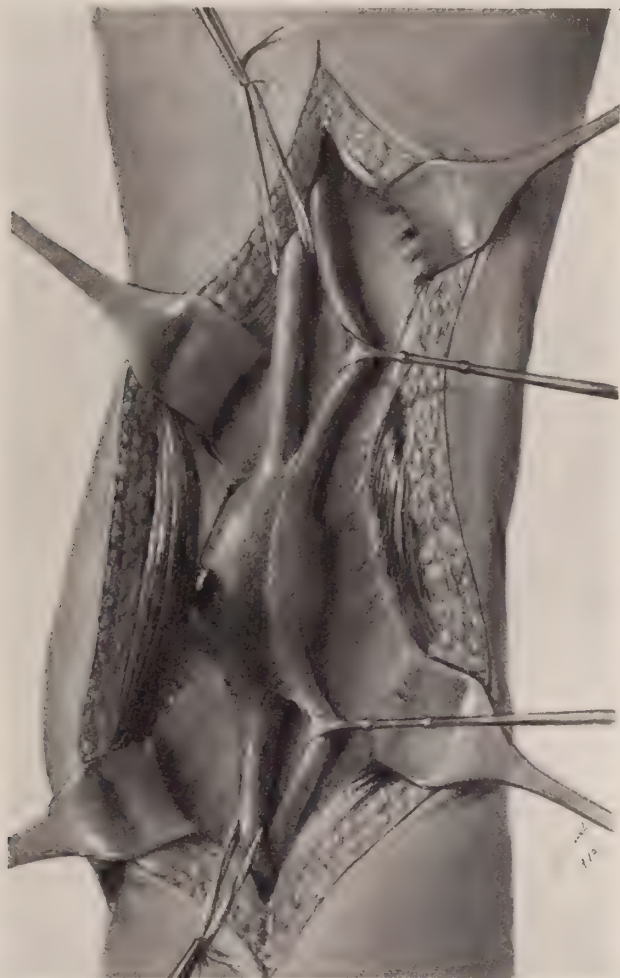


Fig. 1.—The aneurysm and the accompanying vein are exposed, showing dense adherence of the vein to the sac-wall. The small, dark, bulging area in the sac-wall was the site of a threatened rupture of the sac, evidently caused by manipulations during the application of the Moszkowicz test.

plied. Essentially it consists in first applying “a broad Esmarch elastic bandage snugly from the tips of the toes until the upper pole of the aneurysm is reached. At this level the bandage is firmly held in position with a clamp and fixed while the parent vessel is

\*Matas: Testing the Efficiency of the Collateral Circulation as a Preliminary to the Occlusion of the Great Surgical Arteries. (*Jour. Amer. Med. Assoc.*, October 24th, 1914, Vol. LXIII.)

\*\**Annals of Surgery*, January, 1911.

compressed in Hunter's canal by means of a pad or specially constructed clamp until all pulsation in the sac is absolutely arrested and the aneurysm is stilled. After five minutes in old subjects and eight in younger ones the elastic bandage is quickly removed while the compressor still secures the main artery. Close attention must then be given to the returning hyperemic wave, and the progress

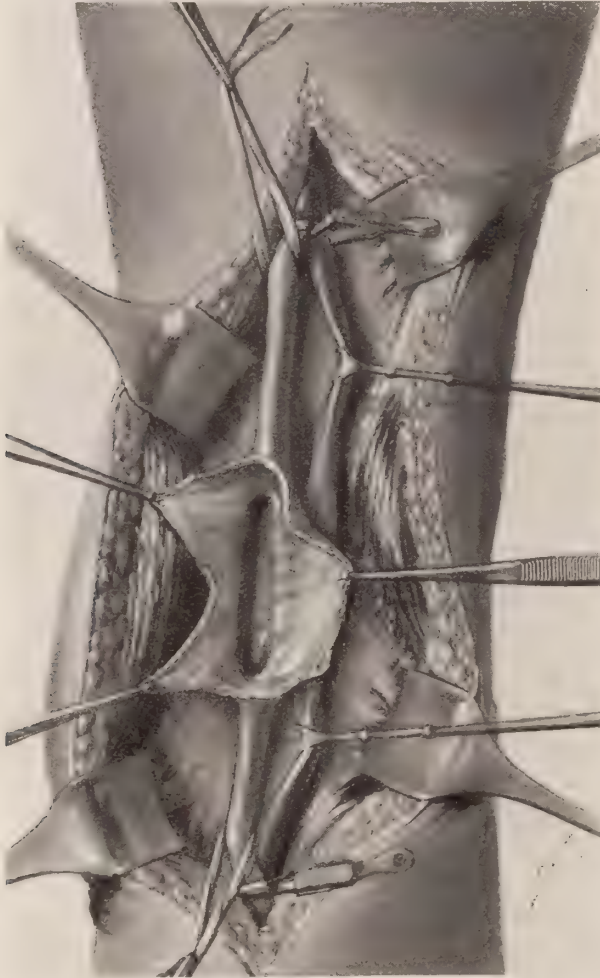


Fig. 2.—The aneurysmal sac opened, showing the entrance and exit of the popliteal artery. The drawing greatly exaggerates the groove between these points.

of the blush is noted as it descends, rapidly at first, in the zone immediately below the level of compression."

If a living color returns throughout the leg within a few minutes, one may conclude that a satisfactory compensatory circulation is probably present and that a type of operation involving occlusion of the parent artery may be utilized with impunity. A contrary

deduction must be made where, instead of a blush, there remains the cadaveric appearance resulting from application of the elastic bandage, whether this be in part or in toto—and an operation must be done of such character that the arterial channel remains intact or, if disturbed, is reestablished.

It is thus apparent that the mere recognition or diagnosis of an aneurysm is quite insufficient to establish a plan of operation. Only a most painstaking study can designate with accuracy the path along which safety lies, but, in addition to the tests, there are certain other features the presence or absence of which means much when interpreted properly. For example, in the case of a popliteal aneurysm there may or may not be present the normal pulses of the foot. Their absence means that compensatory circulation is probably sufficiently developed to sustain the life of the limb, provided no tissue degeneration or destruction is present at the time of examination.\* A moment's thought will convince one of this. How else could a foot survive, its dorsalis pedis and posterior tibial arteries obliterated, other than by a collateral circulation which was present either before obliteration took place or came into being as the normal channels went out of commission, usually a gradual process? The *presence* of these pulses should always put one on his guard, since notice is thus served that there has been no demand for the development of a collateral circulation. It may or may not be present.

Tests have demonstrated that many perfectly normal individuals have very well-developed collateral circulations in their limbs, but it is natural to suppose that, where the absolute need for one has not become manifest, any such vicarious blood supply is liable to prove inadequate in an emergency. Therefore, where the normal pulsés are present distal to extremity aneurysms, one should carry out collateral circulation tests much more rigidly than where they are not present. Accuracy, though, is greatly to be desired in either case, and painstaking efforts will be rewarded as is well illustrated by the following case.\*\*

Toward the end of August, 1915, Mr. W. D., aged forty-three, from Sydney, Nova Scotia, was referred to me by his physician, Dr. Wm. Bruce, for the relief of an aneurysm of the right popliteal artery. A definite history of syphilis, practically untreated and of many years' standing, was obtained and corroborated by a positive Wassermann reaction. The popliteal swelling had been present only one month, but indefinite pains of a so-called rheumatic character had been observed in the region of the knee-joint for about three

\*Certain sensory phenomena must also be considered in determining adequacy of the compensation.

\*\*This case was reported before the Johns Hopkins Hospital Medical Society, October 18th, 1915, and published in the *Bulletin of the Johns Hopkins Hospital*, April, 1916.



months. Once the tumor had made its appearance, however, its growth had been rather rapid, and it had given rise to a considerable amount of pain, and, in addition, a disturbance in the return circulation, manifested by a gradually increasing edema, had become apparent in the lower leg. A certain degree of varicosity was present in the veins below the knee, but the egg-sized, oblong, pul-

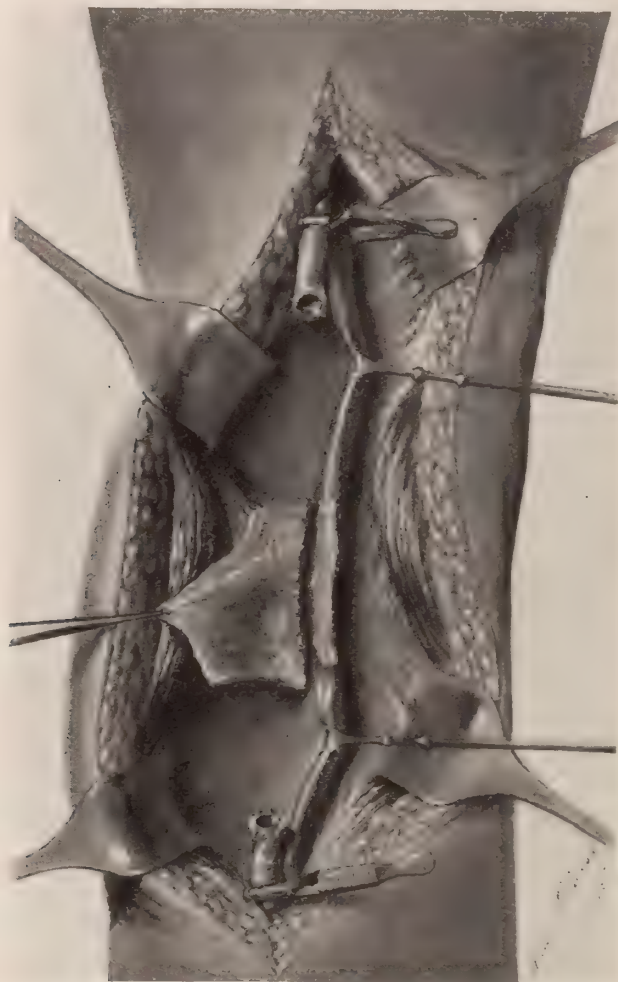


Fig. 3.—The aneurysmal sac cut away from the popliteal artery. The vein was separated from the arterial sac by taking part of sac-wall with it. With the exception of the ends of the sac, all the remaining portion was left *in situ*. The ends interfered with the placing of the venous graft.

sating tumor back of the knee was obviously the prime factor in the impaired venous return.

It was hardly to be expected that an adequate collateral circulation could have developed, in view of the short duration of the aneurysm, and especially in view of the fact that the dorsalis pedis

and posterior tibial arteries of the foot pulsated normally. Most imperative, therefore, was a careful search to determine the state of the collateral circulation, for a definite knowledge of this feature was essential to the selection of an intelligent operative procedure.

At two independent sittings, therefore, the Moszkowicz test, as given by Matas, was carefully carried out, the result being almost



Fig. 4.—The vein graft has been sutured to the ends of the popliteal artery and the aneurysmal sac wrapped around it for the purpose of reinforcement.

totally negative. Occlusion of the popliteal artery proximal to the aneurysm left a limb whose bloodless, cadaveric appearance gave mute evidence of what would occur if, in the treatment of the aneurysm, some means were not found for preserving the normal arterial flow. Nor was this a case in which time could be spared for an attempt to develop a collateral circulation, since the aneurysm

was increasing in size somewhat rapidly, and the man was very anxious to return to his work.

On September 3rd, at the Union Protestant Infirmary, I exposed the aneurysm, prepared to do any operation that might be indicated. A spindle-shaped tumor, as shown in Fig. 1, presented and was opened on its dorsal aspect, revealing only two openings, the entrance and exit (Fig. 2) of the popliteal artery, the two points being distant about an inch and a half from one another, and only the faintest sign of a groove being apparent between them. The popliteal vein was so densely adherent to the sac that it was impossible to separate it without taking part of the sac wall, which, of course, was done.

To have attempted a reconstructive Matas endoaneurysmorrhaphy under the circumstances would have amounted to little more than courting disaster. Hence, keeping in mind the insufficient collateral circulation, without further ado I removed about 15 cm. of the internal saphenous vein from the affected leg at the knee and, after proper preparation, interpolated\* about 12 cm. of it between the severed ends of the popliteal artery. Only the ends of the sac were cut away (Fig. 3), the remainder being left to be folded around the transplant as a partial reinforcement (Fig. 4). Carrel's end-to-end suture was used, and the distal end was united to the graft first, because the artery was most deeply situated at that point. It is worthy of note that the wall of the artery was thicker than normal, had numerous pinhead-sized dull-gray plaques in its intima and was so friable that it tore badly in its preparation for suture, rendering necessary the removal of an additional centimeter and a half from the distal end. The suturing itself was accomplished without great difficulty, and at its conclusion blood went through the graft in a normal manner, except for the presence of the marked dilatation so graphically illustrated in Fig. 4.\*\* The dorsalis pedis and posterior pulses could be felt at once and remained normally palpable at all times. An uninterrupted convalescence ensued and the patient returned home not only able to walk well, but also, as he himself volunteered, "able to get on his shoe with a sock on his foot," whereas, prior to operation, this had been impossible owing to the edema. All pain and discomfort in the leg had disappeared and a curious preoperative 'dead feeling' of the great toe had given way to a normal feeling. Pulsation could be felt all along the vein graft as well as in the arteries of the foot.

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\*The vein segment was 'reversed' so that its valves *faced* the foot instead of the heart, as they normally do. This is a most important step in every venous transplant, since the arterial current will be forced to break down the valves unless they are reversed.

\*\*It is hardly necessary to add that this dilatation is really a 'normal' occurrence in every instance in which a vein is subjected to arterial pressure. The vein wall is thinner and has less muscle tissue than the arterial wall, and it therefore gives. Later on, it hypertrophies and undergoes a fibrous change which enables it to withstand continued arterial pressure without difficulty.



TENDON TRANSPLANTATION.  
CONCLUSIONS FROM A STUDY OF ONE HUNDRED CASES.

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By ARTHUR T. LEGG, M. D., of Boston,  
AND  
FRANK R. OBER, M. D., of Boston.

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It is the intention of the writers to present some of their views relating to methods, and bring out the points which they deem of importance, in performing tendon transplantation for infantile paralysis.

We all know that every man, doing this work, has his individual method of procedure, and a method which is apparently successful in one man's hands is often productive of poor results in those of another. Therefore, no special stress will be laid on any single method, but an endeavor will be made to emphasize, not only those points which we think essential to a successful result, but also to emphasize the causes of poor results and failures.

With these objects in view we have drawn conclusions from a study of 100 cases of tendon transplantation, operated at The Children's Hospital, Boston, during the five years preceding January 1st, 1914. Transplantation at the ankle alone will be considered.

*General Considerations.*—A matter of prime importance, before even attempting a transplantation, is the choice of a suitable case, one in which, at least, it is possible to improve the present condition. There is no doubt that there are cases, where tendon transplantation is done, in which permanent benefit cannot be derived, because, although there may be one good group of muscles, there is not enough power in other groups to give an ultimate good muscle balance.

The time elapsed, since the onset of the paralysis, is also of extreme importance. It is our opinion that at least two years should have elapsed before doing a transplantation, but it is to be understood, that we do not claim that every individual paralyzed muscle will have necessarily recovered completely. The chief reason for not waiting longer is this: it means, as a general rule, that a brace is worn during the period of recovery to prevent or correct deformity, and as a result muscles, which have not been paralyzed at all, will frequently become permanently weakened or even degenerated if they are constantly immobilized by a brace.

The muscles actually paralyzed must be definitely determined upon, as we all know that there may be muscles which appear to be paralyzed but are only apparently so from constant overstretching by a foot being maintained in a position of severe deformity, *e. g.*, a marked equinus, due to contracture of a strong tendo Achilles, which has been allowed to persist a number of years, and which may lead one to believe that all the anterior groups are paralyzed, *when the apparent paralysis is due wholly* to the fact that the muscles are fatigued from such constant overstretching or are mechanically unable to act.

The question of muscle balance should be carefully considered. This is a question which is all important and cannot be emphasized too strongly.

No hard and fast rule can be laid down in regard to the choice of tendons to be used, as it is wholly a question of determining the relative strength of the functioning muscles in order to decide which tendon to use and where it should be inserted, so that ultimately we get as perfect a balance as possible. Another thing to be carefully considered is whether or not a transplanted tendon will mechanically assume a new function.

Leverage is also of importance. A tendon which has been accustomed to act as a long lever will work poorly as a short one, *e. g.*, the extensor proprius hallucis when attached to the *head* of the first metatarsal works at a better advantage than it would if attached to the scaphoid.

*Operative Considerations.*—If there be any deformity, bony or otherwise, and there usually is, it should first be overcome by manipulation, tenotomy or even osteotomy, and we should not proceed without being able to secure easy over-correction.

The incision should be made so that it will not come directly over the course or insertion of the transplant; this will avoid the possibility of the tendon uniting with the cut edges of the skin.

If possible, tendon enough to reach the new point of insertion should be obtained, and it should be cleared to its origin, as far as reasonable, at the same time preserving its nerve supply, in order to get a long pull in a straight line. We believe two strands of number 12 to 18 silk should be used, and these should be quilted to the end of the tendon. The place for insertion is exposed and a tunnel, large enough freely to contain the tendon is now made between the two wounds. This tunnel should pass under subcutaneous fat and fascia going beneath the annular ligament. If the tendon is long enough to reach the bone, we believe the best method is to insert the tendon beneath the elevated periosteum and *fasten it firmly*, by means of the above size strands of silk, through a drill hole in the bone.

The size of the silk should depend on the size of the tendon. The knot should be covered by the elevated periosteum or tendon.

The tendon should be inserted without tension for this reason: When apparatus is removed, the foot, being over-corrected, will tend to assume a normal position, and in consequence of this the transplanted tendon may be unduly stretched, producing a condition of fatigue from constant overstretching. An overstretched muscle will not function properly, if it does at all.

In closing the wound, we suture the tendon sheath. The subcutaneous fat and fascia should be united as carefully as possible in order that no union between tendon and cut edges of superficial structures may occur. Perfect apposition of skin edges without tension should be obtained.

*Post-Operative Treatment.*—Post-operative treatment begins with the application of the first dressing. A plaster of Paris cast, with the foot over-corrected in order to relieve the insertion of strain, is applied over a small sterile gauze dressing, which has been covered with sterile sheet wadding rollers.

The patient should be kept in bed at least ten days, so that the foot will not become passively congested.

At the end of three weeks, mild, superficial massage may be started, provided it does not cause discomfort. The plaster should remain on about twelve weeks, at which time the tendon should be firmly united to its new insertion. A brace is now applied, muscle training begun, and, later, slight weight bearing allowed which is gradually increased. The brace should be worn two to four months, depending on the tendon transplanted.

*Causes of Failure.*—(1) Poor selection of cases; (2) faulty technique; (3) inefficient after-treatment.

The chief cause of failure is the selection of a case in which there are no tendons of sufficient strength to assume new function.

In obtaining over-correction of deformity it is often necessary to tenotomize tendons. If the foot is put up in marked over-correction and the tendon opposed to transplant is under considerable tension, a poor result from non-union of the tenotomized tendon may be obtained.

*Tendons transplanted without regard to either leverage or muscle balance.*—For example: We have all groups good except the anterior tibial. It is desired to substitute a tendon to get dorsiflexion. If both peronei are placed at the insertion of the anterior tibial a bad varus may result, as the unparalyzed posterior tibial, having no muscle in opposition, pulls the foot into varus.

Given a case in which a tendon has two properties, one of which is extensor and is to be used as a flexor, the tendon should be brought to the anterior part of the foot as directly as possible because if it be swung posteriorly in its approach to its new insertion



its extensor properties are increased and for this reason an equinus position later on is aggravated, although the valgus is corrected.

A not infrequent cause of failure is allowing a child to walk on his plaster early, the bottom becoming softened and, as a result, over-correction is lost, undue strain is brought on the insertion, and this tends to pull the silk out.

The silk knot or silk extension, if not well buried or covered with tissue and superficial structures, will often be irritated from shoe or brace pressure and slough out.

*Too Long Wearing of Apparatus.*—If we are going to get a good functional result it should be apparent six months after operation, therefore the continuance of brace after this time is deleterious as it inhibits the function of all muscles, and, as has been said before, may cause weakening or degeneration.

#### CONCLUSIONS.

A good functional result is the aim of tendon transplantation, therefore, we should choose cases in which transplantation offers some hope of improvement.

Each individual case is a law unto itself; hence, we should accurately determine the muscles paralyzed and the relative strength of muscles which are only weakened, and attempt to obtain perfect post-operative muscle balance.

We should give strict attention to minor details in our technique, so that we may obtain perfect attachment of tendon to bone and carry the tendon, with possibly a part of its muscle, in a course that will act to the best mechanical advantage.

After-treatment is of vital importance to the success of the operation.

## PHASES OF THE CHRONIC ABDOMEN AND OF THE ACUTE ABDOMEN.

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An abdominal tumor presents almost invariably a clinical picture of fascinating interest. Upon the diagnostic side no amount of experience is too much to make even a fair average of correct guesses on any considerable number of cases. We have not the advantage of dealing with a tumor growing in a closed cavity, such as the skull or chest, where pressure signs may allow of a very minute localization of it. On the other hand, we have a very great advantage with abdominal tumors on the therapeutic side, on account of the strategic advantages of the abdomen as a surgical field.

In the second volume of his "Differential Diagnosis," Cabot has analyzed the case histories of a large number of cases of abdominal tumors, and has tabulated the cause of the tumors. These tables are extremely valuable, using the figures there set down. By a rearrangement of the tables to suit the present case, we find the following facts:—

Cabot reviewed 17,655 cases.

The principle distribution of the tumors were:

Tumors of the spleen.....	5,307.
(Enlargement of the spleen in typhoid 3,519. Of splenic tumors only 157 could possibly be surgical: Pernicious anemia, 90; Banti's disease, 56; malignant neoplasm, 7; abscess, 4; total, 157.)	
Tumors of the ovaries and tubes.....	4,465.
(Of these, salpingitis—2,515.)	
Tumors of the uterus.....	1,668.
(Fibroid 1,539. Malignant tumors 129.)	
Tumors of the liver.....	1,428.
(Of these 1,143 are medical.)	
Enlarged gall-bladder .....	1,200.
(Stone 1,095. Infection 105.)	
Tumors of the kidney. . . . .	914.
Tumors of the stomach. . . . .	811.
Tumors of the intestine and omentum.....	607.
Malignant pancreas or gall-bladder.....	119.

Of the total cases, 11,219 might fairly be called surgical cases.

Of these, in 4,393 the diagnosis would hardly come under the head of a difficult differential surgical diagnosis either because

(1) the tumor is small, or (2) in the pelvis and only palpable per vaginam, or (3) both, or (4) in the abdominal wall, or (5) there are other symptoms to help clear the diagnosis. These cases are:

Salpingitis. . . . .	2,515.
Hernia. . . . .	1,099.
Tubal pregnancy . . . . .	348.
Cyst of broad ligament. . . . .	132.
Abscess of abdominal wall. . . . .	131.
Tuberculosis of the kidney. . . . .	101.
Renal calculus . . . . .	67.

Total, 4,393.

Finally then there were 6,826 cases of abdominal tumor that might fairly be said to present difficulties of surgical diagnosis, in which the tumor alone is the prominent factor. Their relative frequency was as follows:—

Fibroid of the uterus. . . . .	1,539.
Ovarian cyst . . . . .	1,282.
Enlarged gall-bladder (stone). . . . .	1,095.
Neoplasm of the stomach. . . . .	811.
Tumor of the ovary. . . . .	272.
Tumor of the intestines. . . . .	224.
Tumor of the liver. . . . .	201.
Tuberculous peritonitis . . . . .	163.
Tumor or enlargement of the spleen. . . . .	157.
Malignant uterus. . . . .	129.
Malignant kidney. . . . .	119.
Malignant pancreas. . . . .	119.
Enlarged gall-bladder (infection). . . . .	105.
Pyonephrosis. . . . .	103.
Neoplasm of the peritoneum. . . . .	95.
Cancer gall-ducts or pancreas. . . . .	88.
Abscess of the liver. . . . .	66.
Perinephritic abscess . . . . .	59.
Intestinal obstruction . . . . .	57.
Neoplasm abdominal wall. . . . .	49.
Hypertrophy of the ovary. . . . .	48.
Intussuception. . . . .	45.

Two-thirds of the abdominal tumors large enough to be easily palpated through the abdominal parietes, then, we may roughly say, using the above table as a basis, are either uterine fibroid, ovarian cyst, enlarged gall-bladder, or gastric neoplasm.

One-sixth of all such tumors are either some tumor of the ovary, intestines, or liver, or tubercular peritonitis, or tumor (enlargement) of the spleen or malignant uterus.

It is a great advantage in diagnostic work to have percentage tables of this kind, in the mind's eye, to draw upon. In our routine diagnostic discussions, not only of tumors of the abdomen but of other cases, we have come to the habit of concluding by some such



judgment as this: "Fibroid 90 per cent., cystic ovary 9 per cent., pregnancy 1 per cent.," or "appendicitis 70 per cent., gall-stones 28 per cent., ulcer of the stomach 2 per cent." This method may not possess the commendable accuracy of certain styles of diagnosis, but recommends itself to experience in this field, and will be found useful by those who are not too proud to be fallible.

In old people there is one element in the diagnosis of abdominal tumors which should not be lost sight of. That is the flabbiness of the abdominal wall. This applies not only to women with an abdominal wall sagging from many pregnancies, or to flabby walls due to accumulations of abdominal fat. It applies to men as well as women, and is especially notable in those who have always been thin. In these cases there will be no rigidity in the presence of an acute abdominal inflammation. A case in point is as follows:—

CASE I.—A. J. D., male, *æt.* seventy-four; grocer. He was never seriously ill during his entire life until about three weeks before his entry to the hospital. At that time he had pain in his stomach, which came on rather suddenly, accompanied by vomiting. No physician was called, and he attended to his duties the next day. He, however, had considerable pain in the abdomen then and for the succeeding two weeks, when a physician was called, and discovered a lump in the right side of the abdomen. He made a diagnosis of cancer and advised operation. This was not satisfactory to the patient at first, but after the continuance of pain for some days he submitted to an exploratory laparotomy.

The patient was a thin old man of the physique usually called 'wiry.' His abdominal parietes were soft and made palpation very easy.

Examination revealed a tumor the size of two large fists in the right side of the abdomen about midway between the costal arch and the crest of the ilium. It was not particularly movable, but not particularly firmly fixed. It was very tender. The temperature was 99.4° F. The leucocyte count was 18,000.

On opening the abdomen in the right side of the right rectus, a tumor at the head of the cecum was found, which was at first thought to be malignant, but on further examination the appendix was discovered—a red and green friable organ adherent to the ilium and the lateral left wall of the colon. It had ruptured into the mesentery—just which mesentery it would be impossible to state, and the combination had produced a solid tumor.

Another case in which a thin abdominal wall allowed of an unusual amount of palpation, and resulted in a diagnostic failure, was that of an elderly lady from whom the cystic kidney reproduced in Fig. 1 was taken. This presented as a somewhat soft, slightly movable tumor in the right side of the abdomen, about on a level with the umbilicus. It was not painful. It had been observed about six months. There was no other symptom and no change in the urine or blood or stool to help the diagnosis. Our diagnostic conclusions were: Gall-bladder 30 per cent.; tumor of the colon 55 per cent.; ovary 5 per cent.; kidney 10 per cent.

A patient, whose history has been recorded in some detail in



Fig. 1.—Large single cyst on right kidney, erroneously taken for an enlarged gall-bladder.

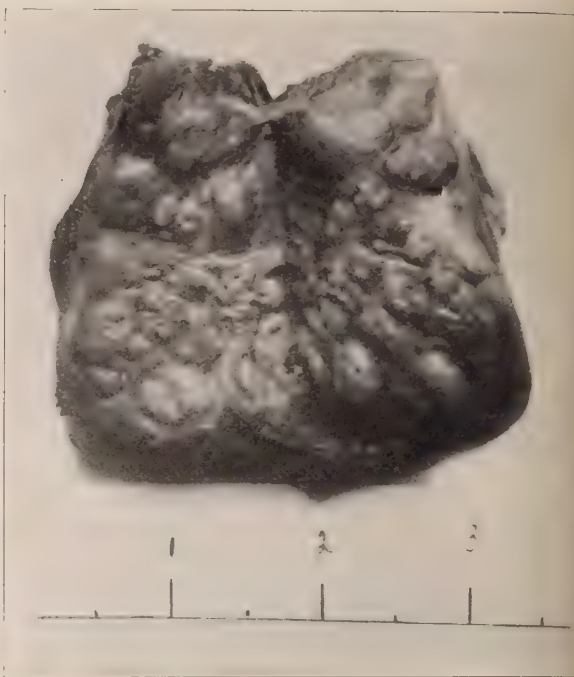


Fig. 2.—Gumma of the liver, excised for carcinoma or sarcoma. Later supposed to be a tuberculoma.

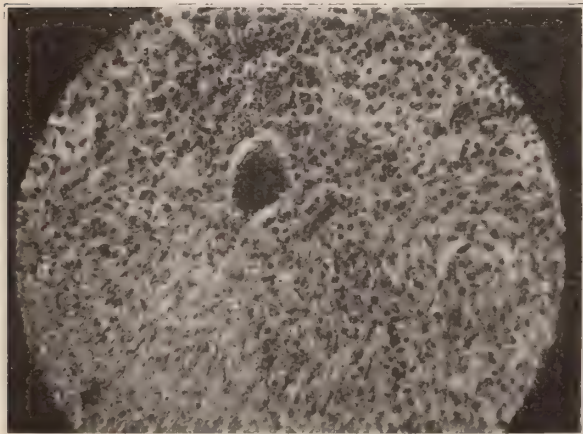


Fig. 3.—Microphotograph of tumor in Fig. 2.

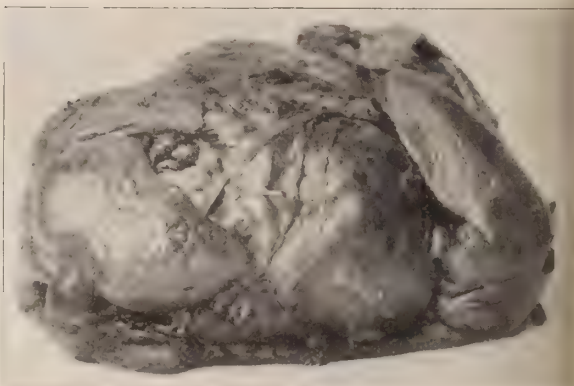


Fig. 4.—Large tumor found in the upper left quadrant of the abdomen of an elderly man. Spleen to the right. Kidney to the left with small cyst on its surface. Course of ureter marked by pins.

another place,\* a man of sixty-four, also had a soft abdominal wall which revealed a sausage-shaped tumor in the right side which had been present five weeks and turned out to be an intussusception at the ileocecal valve.

Still, of course, with all one's percentage tables and warnings, each individual abdominal tumor is a single problem. Figs. 2 and 3 are pictures of a tumor of the liver that represents one of the most humiliating diagnostic experiences one of us ever had:—

CASE II.—Male, *æ*t. thirty-eight, married, a painter and paperhanger by trade, applied at the outpatient department of the University of Kansas, May 31st, 1911. He complained of 'catarrh of the stomach and the throat.' His family history was of no interest, and save for the fact that he had had lead poisoning fourteen years before, his personal history was negative.

He had a bad cough and extensive consolidation of the right lung in the upper lobes with many râles, bronchial breathing, increased fremitus, etc.

He complained of pain in the epigastrium, especially when the stomach was empty. He had to have something to eat as soon as he awoke. In the abdomen a tumor was discovered between the median line and the right costal arch—a soft, tender, almost immovable mass, the size of a grape fruit. He had the scar of an old rectal fistula. His temperature was 99.2° F. He had lost 12-15 lb. in weight.

An *x*-ray showed shadows in the apex of the right lung and also showed the stomach 3 in. below the umbilicus, undergoing vigorous peristalsis.

The diagnosis was pulmonary tuberculosis, and some abdominal tumor, probably cancer of the stomach.

He was removed to the tuberculosis pavilion of the City Hospital. No tubercle bacilli were ever reported in his sputum.

After a residence of three weeks it was decided to do an exploratory laparotomy. This was done at the City Hospital by the surgical chief, Dr. W. J. Frick.

When the abdomen was opened a mass of adhesions was found around the pylorus, due to a yellowish tumor between the right and left lobes of the liver (Fig. 2). It was encapsulated, was the size of a lemon, and when cut open was seen to be studded with caseous masses. It was removed by a very pretty piece of operative surgery, and the patient made a complete recovery from this part of his ailment.

The sections of the tumor (Fig. 3) showed what seemed to be a tuberculosis. The literature upon tuberculosis of the liver was thoroughly looked up and it was designed to report the case.

A few months later the unhappy sequel occurred. The patient left the tuberculosis pavilion with the lungs in about the same shape. A month or two later he had a very swollen elbow and knee, and consulted another physician, who put him on salvarsan, KI, and mercury. The patient took some pains to visit us and show us that he was getting better on this treatment. The lungs cleared up very rapidly and the 'rheumatism' got well. The tumor was evidently a gumma, and the lung trouble syphilis.

In looking back over the case, there seems to be much excuse for the mistaken diagnosis. A man, losing in weight, with temperature, a consolidation of half of one lung at the apex, and the scar of a rectal fistula certainly deserves to be taken for tuberculosis



of the lungs, even in spite of the fact that there were no bacilli found in the sputum. The resemblance of the section of the tumor to tuberculosis speaks for itself.

The tumor shown in Fig. 4 is suggestive of another point in connection with abdominal tumors. It was originally reproduced in *Surgery, Gynecology and Obstetrics* (Vol. XXII, No. 2) with a report of the case. The patient was a man of sixty-two, who had carried this abdominal tumor for fifteen years. It was discovered that he had no testicle on the left side and it had been supposed that this cyst was a dermoid of the testis.

Sir William Osler has called attention to the fact that no diagnosis of abdominal tumor in the male is complete without an examination of the scrotum.

For the *acute abdomen*—by which we mean sudden abdominal pain, vomiting, usually fever, rapid pulse, nausea, possibly shock—we have no table allowing us to determine the relative frequency of the causes. They would probably, however, stand somewhat as follow:—

1. Appendicitis.
2. Pneumonia or pleurisy.
3. Renal or gall-stone colic.
4. Strangulated hernia.
5. Perforation of the stomach or intestine (including typhoid perforation).
6. Ruptured tubal pregnancy.
7. Gastric crisis of tabes.
8. Intestinal obstruction (other than strangulated hernia).
9. Rarer causes.

It should never be forgotten by the diagnostician that a lobar pneumonia of the right lower lobe can, especially in children, by irritating the tenth, eleventh and twelfth intercostal nerves produce pain, rigidity and tenderness in the right side of the abdomen, which accompanied by the fever, leucocytosis and vomiting of the pneumonia will look exactly like an acute appendicitis. We have seen a great number of such cases brought in for operation. We have seen an almost equal number of cases of pleural effusion brought in with the same diagnosis. The only way to obviate the mistake is the simple one of a complete physical examination of the lower parts of the chest behind.

One of the most interesting subjects in medicine is that of ectopic gestation, another cause of the acute abdomen. The pictures in Fig. 5 were obtained from our fiftieth case of extra-uterine pregnancy. In that series we have naturally had a number of interesting experiences. In 2 cases we have operated patients twice for tubal pregnancy, first on one side, then on the other. This would seem to give support to the idea that the primary cause of the condition lies in some congenital malformation in the tube itself.

The symptoms of tubal pregnancy, before rupture has taken place, are quite definite and have not, we believe, been given sufficient prominence. The usual history is that a woman will miss a menstrual period and believe herself pregnant; in the course of from two weeks to three months she will begin to flow. She usually pays no attention to this at first, thinking that it is simply an ordinary menstrual period returning or that it is a miscarriage. She seeks medical aid only when the flow has lasted for a week or ten days and is increasing in severity. A vaginal examination at this time



Fig. 5.—Unruptured tubal pregnancy. (1) Tube and ovary (right) after removal; (a) enlargement in Fallopian tube; (b) other end of Fallopian tube; (c) ovary. (2) Same specimen with the tube cut open; (a) site of ectopic pregnancy; (c) ovary.

reveals a small mass in one or the other side of the pelvis. This is sufficient evidence usually for a diagnosis.

A typical history, that of the patient from whom the specimens in Fig. 7 were obtained, is subjoined:—

CASE III.—Mrs. H., *æt.* twenty-seven, married only a year. Never pregnant. Menstruation regular, sometimes painful and always heavy; started at the age of fifteen.

Illness began January 12th. Menstruation started then. It stopped on Friday. The flow recommenced on Monday. From then on the flow was only a little every day.

A few days before her February period commenced she had some pains in the lower abdomen, called acute indigestion. The February menstruation was



Fig. 6.—Rupture of the transverse colon.



Fig. 7.—Rupture of the transverse colon; view from mucosal side.



Fig. 8.—Rupture of the gall-bladder diagnosed as an acute appendicitis. (Arrow shows site of perforation.)



a few days late and was exceedingly heavy. When it had been on for three days she passed some clots. A few days later she passed some more clots and was curetted under the belief that she had had a miscarriage. After that she flowed nearly continuously until the last of May when she was brought to the hospital. She consented to come because she had had an attack of pain in the lower abdomen May 28th, 1915.

Pelvic examination showed the uterus fixed and retroverted with a small mass on the right side.

Operation May 28th, 1915, showed the uterus fixed posteriorly on account of the enlarged and inflamed right ovary and tube. There was a mass the size of a large cherry in the tube near the horn of the uterus.

We have recently had 2 cases of acute abdomen resulting from quite rare causes, one of them of unique interest. The latter, which proceeded to a rapidly fatal termination, was a rupture of the transverse colon. The pictures of the specimen are reproduced in Figs. 6 and 7.

CASE IV.—The patient was a woman of sixty-two; married; had one child. She had never had any serious illness. She was, however, very constipated and had not had a movement of the bowels for eight days previous to the day of her death. She had consulted a homeopathic physician, who had reassured her for five days that everything would be all right, in spite of an alarming distention of the abdomen. At the end of this time, at three o'clock in the morning, she awoke with a sudden pain in the abdomen and then a 'giving away feeling' with rapid prostration. She was dead within half an hour.

An autopsy was held. The abdomen was enormously distended and tense. There was a dull note over it, and on making the ordinary straight post-mortem incision the peritoneum was seen to be choked with mushy feces which came welling out of the incision. There was enough to fill two wash basins full. The only solution of continuity in the intestinal tract was the punched perforation on the transverse colon, illustrated in Figs. 8 and 9. It was apparently the site of an old ulcer, but there is no data which gives us any idea of the cause of the ulcer.

A very unusual cause of the acute abdomen is perforation of the gall-bladder. The differential diagnosis is practically impossible to make from acute appendicitis, or from perforation of the duodenum. Moynihan reports ("Duodenal Ulcer") the successful diagnosis of a perforated gall-bladder, but the condition is so rare that most diagnosticians would never think of it when confronted with a case of acute abdominal distress. In the case of Moynihan's it is stated that the diagnosis was arrived at because, while the patient evidently had a perforation of a hollow viscus, he was not sick enough to have a duodenal perforation. The severity of the symptoms, however, depends on whether the gall-bladder contains pus or just bile, so that this diagnostic sign would not always hold. We feel sure that most cases are diagnosed as was Mayo-Robson's (Allbutt's "System of Medicine," Vol. IV, p. 237) by finding bile flow from an abdominal section, when appendicitis or duodenal perforation was expected.

A specimen illustrating this condition is shown in Fig. 10. The patient was a woman of sixty-seven, who had a sudden abdominal attack, which was diagnosed acute appendicitis. On opening her abdomen through an ordinary appendectomy incision, fluid, which seemed pure bile, escaped, with some pus and fibrin flakes. A drain was inserted and the patient returned to bed where she stayed for five days; she was left so long because her condition was constantly improving. At the end of that time she was reoperated, the incision being a high right rectus. Several gall-stones were found free in the abdominal cavity and a perforation in the dome of the gall-bladder. A cholecystectomy was done, the abdomen was freed from gall-stones, and the patient made a complete, though slow recovery.

Whatever the cause, there are two rigorous rules for the treatment of the acute abdomen:—

1. Do not give a cathartic.
2. Do not give any food by mouth.

A cathartic will not make much difference if the case is not serious. If it is serious, a cathartic will only do harm. It may rupture an appendix, or tighten an intestinal obstruction, or further strangulate a strangulated hernia, or break out the plug that is holding the omentum in a perforated gut, or spread a peritonitis. Whatever the condition, it can do no good.

## CAVERNOUS ANGIOMA OF THE LIVER.

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By J. SHELTON HORSLEY, M. D., of Richmond, Virginia.

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Operations upon growths of the liver have now assumed a rather definite technique, and tumors of considerable size have been removed successfully by Keen and other surgeons within the last few decades. It was formerly the custom to cut through the tissue with the actual cautery because of the hemorrhage. This, in most cases, however, is unnecessary. If the incision can be fashioned in a wedge-shaped manner so that raw surfaces of liver can be made to appose each other by sutures, the hemorrhage is readily stopped. The best suturing material is very stout catgut. This may be passed with a liver needle or by the fenestrated end of a probe, or by passing an ordinary large round needle, eye first. The important thing is to tie the sutures just tightly enough to appose the raw surfaces of the liver and not tightly enough to cut through. C. H. Mayo has often called attention to the fact that while blood pressure in the liver is very low, if the liver is wounded, bleeding may be severe and continuous, though with very slight pressure, by packing or sutures, the hemorrhage is readily controlled. Doubtless in many fatal cases of ruptured liver or excision of a tumor, the bleeding could have been stopped by passing sutures instead of relying solely upon packing, which may be easily displaced.

According to Mallory ("Principles of Pathologic Histology," p. 314) the true cavernous type of angioma is rare. He doubts if the so-called cavernomas of the liver are to be regarded as true tumors, and thinks that they suggest an abnormality of the blood-vessels similar to a vascular nevus of the skin. Mallory says: "True cavernous tumors consist of large irregular cavities separated by thin non-vascular walls of connective-tissue lined on each side with endothelial cells. These partitions have just the structure of the valves in veins."

Pure angiomas are, of course, without any epithelial elements, and consist largely of a connective-tissue frame-work supporting blood-vessels. In the cavernous type of angioma, the partitions in the blood spaces resemble the structure of valves of veins. Occasionally, where there is a starting point of a new space or possibly where an old space has become obliterated, whorls of endothelial cells are found. Such a whorl is shown in Figs. 3 and 4. Endothelial tissue is always prominent in an angioma.

While simple angiomas of the capillary, arterial, or cavernous





Fig. 1.—Drawing showing angioma projecting from the lower surface of the liver. The gall-bladder, which was adherent, has been dissected free.



Fig. 2.—Drawing showing the angioma opened. The tumor is natural size, but the blood-spaces have been slightly enlarged to show them more distinctly.

type are not malignant, they are capable of undergoing malignant transformation into sarcoma. In the benign form, however, angiomas tend to grow and infiltrate the surrounding healthy tissue in a manner not done by ordinary benign tumors. It is impossible to observe accurately the growth of angiomas of the abdominal organs, but if these tumors follow the general tendency of similar tumors on the surface, as we have reason to believe, the prognosis would be more serious than in the case of a simple benign tumor, such as a fibroma or adenoma, whose growth is usually slow. Tumors of this latter type, too, tend to push the tissues out of the way, whereas an angioma may infiltrate the viscus from which it arises.

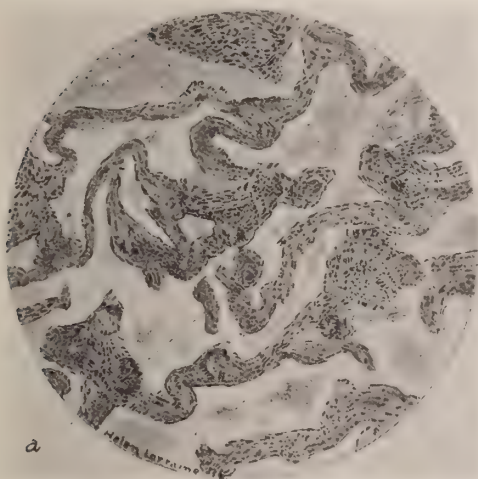


Fig. 3.—Drawing from a microscopic section of angioma of the liver. Note the whorl formation 'a' and the characteristic structure of the partitions. X 87. The drawing was made by Miss Helen Lorraine.

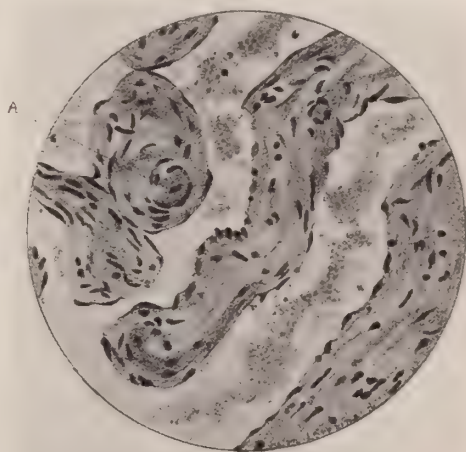


Fig. 4.—Drawing of part of the field shown in Fig. 3. 'A' shows a good view of the whorl referred to in the text. X 385.

The possibility of rupture of a cavernous angioma of the liver, while remote, should be borne in mind.

In the following case, an angioma which sprang from two lobes of the liver and the round ligament, was discovered in the course of an operation for cholecystitis and appendicitis. The patient, Mrs. E., was forty-two years of age, married, and had three children. About five years ago she was operated upon by another surgeon for tubal and ovarian trouble. During the past nine months she had had attacks of pain in the right side of the abdomen, lasting for several days and associated with a quantity of 'gas on the stomach.' The pain was sometimes in the right iliac fossa and often over the region of the gall-bladder. Operation on February

11th, 1916, through a long right rectus incision showed an appendix with chronic fibrosis which was removed, and the gall-bladder, which was thickened and adherent, was also removed. A growth, resembling in shape and size a small gall-bladder, but of a deep purple color, projected from the liver on each side of the umbilical fissure and from the round ligament which it straddled, so that it arose from adjacent portions of the left lobe and the quadrate lobe, and from the round ligament. The growth was covered with peritoneum and was rather sharply outlined, infiltrating but slightly the liver tissue. It was recognized at once as an angioma and was excised by going well into the liver tissue and controlling the bleeding by sutures of stout catgut, lightly tied. As an additional precaution, a cigarette drain was carried down to the site of the growth and fastened in position with the ends of a catgut suture. Very little blood was lost. The patient made an uneventful recovery and, at present, is well.

Among the interesting features of the case are, from a clinical standpoint, the absence of any symptoms pointing to a diagnosis. During the occasional attacks of nausea and vomiting, she says she sometimes vomited blood. The point of tenderness when the pain was in the upper abdomen was located in the usual region of the gall-bladder. The location of the growth would make it impossible to palpate it and the preliminary *x*-ray examination with bismuth meal showed no evidence of a tumor or of any pressure on the wall of the stomach.

From a pathological standpoint the case is of some interest, for it apparently represents a true cavernous angioma of the liver, which, according to Mallory, is quite rare, and from its location it seems at least possible that the growth sprang from the round ligament structures and invaded the liver secondarily. As both lobes of the liver were about equally involved, it is somewhat more probable that the growth sprang from the round ligament structures and involved the liver by extension than that it sprang from both lobes simultaneously and involved the round ligaments secondarily, or that it sprang from one lobe, crossed the round ligament, and involved the other lobe to an equal extent.

The important point in the technique of removing a cavernous angioma is to go into normal healthy tissue and never, under any conditions, cut into cavernous tissue or put a tenaculum or any sharp instrument in it. If, on account of the extent of the growth, this line of procedure cannot be adopted, excision should not be attempted and the case should be either abandoned or injections of hot water given according to the method suggested by Wyeth.



## SPECIAL ARTICLE.

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### MORE OR LESS RANDOM NOTES ON EXERCISE.

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One of the things of considerable importance forgotten by mankind during that colossal halt of civilization we still call the Middle Ages, was a just appreciation of bodily vigor and fullness of bodily powers. Aristotle and his master taught its philosophy and all the Greeks practised its benefits, but only now, twenty centuries and more later, is mankind beginning to think regretfully of their heritage which might have been. The ignorance of the Dark Age shows itself in no place deeper than in its contention that the soul could be independent of the body, and the one exalted while the other suffered neglect and harm. We have outlived such doctrine and to-day whether or not we think of the body as the mere servant of the mind, we begin to realize that health and strength and accomplishment and real life are interdependent conditions based all on a two-phased vigor of body and mind. To develop adequately the mind there is a very elaborate and costly system of institutions, but only relatively few of the mass of men feel to any useful depth the necessity of physical education also. But it will come!

Physical education does not mean muscular exercise wholly,—as it will be the aim of the following few pages to point out. Were the body made up of *independent* tissues and organs, physical exercise would stand for relatively small benefit to the psychophysical organism, but, as we have so often insisted, the organism's unification, on the other hand, is almost complete, one part being in truth only a part, one tissue but one sort of protoplasm, evolved for the *common good*.

We may systematically divide the influences exerted by ideal physical exercise in a broad sense under at least six heads. Benefit is derived because of an increased development of the blood-lymph circulation; of respiration; of digestion; of nervous control; of the musculature; and lastly through the variety afforded both mind and body. A discussion of these briefly is not only hygiene, but, as will appear, thorough-going physiology. It is not intended that the physical exercise meant in this discussion shall be that cut-and-dried, indoor sort that is mechanically performed with dumb-bells,

Indian-clubs, wands, and pulley-weight machines, but rather the all-round activity of the person who loves the open air and nature in all its moods and phases as well as the games of men played outdoors or in. In technical terms, physical exercise is meant and not mere calisthenics, the field of the latter being physiologically but small.

The *Circulation*, including the lymph-flow, is benefited by physical activity by reason of its function as carrier and distributor of the body's metabolic supply and waste. The heart has to work harder to supply more material and to remove more waste from the muscles concerned and from the other body-parts secondarily stimulated. If the exercise is general, as it should be, no small fraction of the body-mass will be directly concerned in this feeding and cleansing, the muscles being half the body. This increased activity of the heart, strengthens it in every way,—makes its nutrition better, its mass greater, its coördination more exact, its nerve-control more perfect. The muscle-tissue of the arteries is also stimulated so that they are more elastic, more prompt to perform their function. In many persons, if not in all, after fifty there is a tendency to deposit calcareous matter in the arteries producing the notorious arterial sclerosis, the prime cause of apoplexy and of the consequent paralysis. To prevent this condition alone, if for no other reason, the development of the habit of abundant physical exercise is vitally important, thus, perhaps, prolonging life.

Vasomotion is a function of far-reaching importance in the organism, having much to do with the control of the various parts' activities. By invigorating the musculature of the arteries this function is made better and more vigorous. Sleep, for example, is a condition partly of cerebral or at least of cortical anemia, and in normal conditions when the cortex is congested sleep is impossible. Widespread muscular activity tends to stimulate and strengthen the vasomotor function, and in particular to supply more blood to the fatigued muscles, thus making the brain physiologically anemic, which predisposes to healthful sleep.

Hough has pointed out that no small part of the benefits of physical exercise come from the more active flow of lymph which it occasions. Reference to the causes of the lymph-flow will quickly show how this is true. In short, however, we may say that the increased metabolism in the tissues causes a more rapid and thorough feeding and cleansing of the cells of the body, especially of the muscles which are everywhere. The amount of 'lymph' produced, that is passed into the subclavian veins, may be taken as a rough index of the activity of the general metabolism; and 'general metabolism' best stands for life itself.

The *respiratory function* profits in the same way from abundant

physical exercise as does the circulation. We have recently seen that muscular katabolism makes proportional demand for oxygen and produces a proportional amount of carbon dioxide (as well as some other excreta more indirectly). The relation between exercise and breathing is often surprisingly delicate even in normal and trained persons,—walking fast a hundred yards or going upstairs rapidly makes us ‘breathe hard’—not only more rapidly but far more deeply. As we have seen, the breath-rate is higher while we are sitting than while reclining and higher yet while standing, and only because the organism’s muscles are more active while supporting the body in a sitting or standing posture than while it is lying flat.

This increased activity develops both the mechanism and the habit of abundant breathing of good air. It develops the diaphragm, the intercostal muscles and the other muscles of respiration. More easily to accommodate the increased function the whole thorax grows larger, the lungs partaking in the enlargement and becoming doubtless more elastic, better supplied with blood, more vigorous in every way. The vital capacity increases fifty or a hundred per cent. or more, and (more important than one might suppose) alone for fresh, *i. e.*, outdoors, air is developed which makes inadequate ventilation, winter or summer, almost painful, and outdoor life in almost any weather a delight. It need not be pointed out how much such a condition, physical and mental, means in saving life formerly taken freely by ‘the great white plague,’ the scourge of humanity, phthisis. Aside from this the development of the lung-area assures an abundant supply of oxygen to the body and so makes more bright and active the vital metabolism.

*Digestion* is furthered by generous physical activity in almost obvious ways. Just as an increased metabolism demands more oxygen, so too, it demands more of other kinds of food to maintain it. Typical of this is one’s appetite after an active day in the woods or about the beaches, mineralizing perhaps, climbing about on the cliffs of our Northern coasts. This is the normal appetite, the proper zest for food which a normal amount of outdoor exercise would regularly bring while we are well. The continual movement of the trunk stimulates the molar movements of the alimentary canal if not its secretory movements. Continued and made habitual, the musculature of the stomach and gut develops with the skeletal muscles, and becomes permanently a more powerful digestive mechanism than before, use developing this apparatus like all the rest. It is the persons of sedentary habits and occupations who suffer from the manifold forms of indigestion and dyspepsia and distinctly not those who largely use their muscles, especially if the activity be of the whole body such as one experiences out of doors. A strong digestion being the securest basis of a long



life, this effect alone of much muscular activity is worth its cost in effort and attention.

The influence for good of abundant muscular activity over *nervous control* has been already briefly discussed above in part. Exercise which results in the development of the whole body-musculature (as always it should do) brings about not only that control which develops skill and cleverness (shown by gracefulness), but develops also a mental control. These two are indeed often inseparable, the physical and the psychical being to some extent aspects of one organism. Thus the modern theory of the feelings and of the emotions in particular demonstrate how inseparable are feelings as parts of consciousness from the bodily movements formerly said to 'express' them. These bodily movements then are part of psychophysical events we call feelings. If they be under perfect voluntary control in all their details so too all the better are the feelings proper which accompany them, and all the more completely is the individual master of himself and relatively speaking master also of his feelings. These two aspects cannot be separated save artificially, for analysis and description. The individual who is most completely and in most detail controller of his body's muscles is, other things equal, also most completely in possession of his mental faculties, sanest, cleverest, most competent, most alive. The reason for this lies partly, doubtless, in the unification of the muscular and neural systems in every portion of the body. It lies in part also in an important basal principle of bodily action not yet clear in all its details, but intimately concerned not only with the theory of muscular exercise but with the entire doctrine of neuromuscular control. We know too little as yet about the nervous system's mode of action to state this matter very clearly, but it is obvious that inhibition reciprocal with actuation plays an important part in the control of our muscles, at least, our skeletal muscles. In less technical terms, when one group of muscles is innervated (*i. e.*, put in action whether potentially or kinetically), its functional antagonist is inhibited. Thus there is a sort of automatic balance in the activity of the muscles not too different in some respects from the principle by which the steam is automatically let into the two ends alternately of the cylinder of an engine. When the steam enters at one end it is shut out from the other end, the piston working back and forth to correspond, and so doing its work. In the body, of course, there is no such rhythmical alternation.

Explanation of this matter is further complicated by researches into the relative activity of muscles at different contractile lengths. It will be recalled that a muscle may be metabolically active, respiring and furnishing much heat, when it shows externally no signs of shortening at all. Thus Ranvier described these four muscular states, extended and at rest, extended and in action, shortened and

at rest, and shortened and contracting. Richer describes the states, somewhat differently, as first, relaxation; second, distention, either passive or active; and, third, contraction either with shortening or with lengthening. This lengthening appears to be more easily observed in smooth muscle than in the cross-striated sort,—for example, smart stimulation of a string of rings out of the frog's stomach not infrequently causes what is apparently an active relaxation or stretching of the muscle. It is certain then that at the present time inhibition has not been discriminated sharply enough from these various conditions of relaxation and active distention, and until it is better understood, little can be done toward unraveling the intricacies of the nerves in their coördination of the muscles, especially as concerns the reciprocating movements of flexion and extension, abduction and adduction, pronation and supination, etc. How complex the problem really is if exact details for separate nerves are demanded (this may be wrong!) may be seen by reference to what was said in describing the distribution of the anterior spinal roots—every muscle, in short, is represented by many roots and segments of the cord, and every root represents many muscles, perhaps many muscle-groups. If one is to think of the nervous system as made up of separate paths like electric wires, all these facts are inexplicable, but they seem somewhat simpler when all the muscles and all the nerves are viewed as one intricate tissue made up of fibrils.

However devious the theory of muscular control in its details, one corollary of it is important for physical education. This principle is that emphasized by Dudley Sargent as well as by less scientific trainers of men—namely, the importance in physical exercise of *voluntary movement*, this inevitably leading to a development of the reciprocal antagonism between flexors and extensors, abductors and adductors, and the rest. In attentive, voluntary movements the mind takes part, the whole nervous system more or less is actuated, the whole neighboring musculature is innervated, and in these ways the value and benefits of exercising are multiplied over what would accrue in a mere automatic local shuffling of the contraction-waves here and there mechanically over the body.

*Muscular development* itself follows from much muscular exercise on the universal biologic principle that use develops protoplasm. However well a person eat meanwhile, if he stay in bed a month, when he gets about again he finds himself 'weak,' and 'shaky,' that is, his muscles have lost their tone and hardness and part of their weight,—they have 'degenerated.' The blood flowing through them might well enough have been of vigorous composition, but because the muscular metabolism was low the muscles degenerated. There was no wear-and-tear, no active demand on either part for food-supply or for waste-removal, and so

they began life on a lower plane of vigor and efficiency. On the other hand continual use develops muscles to a great degree. An expert finds it not difficult to tell a stranger much about himself from what appears to be a casual look or two at his 'palm' or his face, but which really resolves itself into a skilful scrutiny of the body's development so far as may be. The muscles bear in their shapes and habits of movements the record not only of occupation, but of mental habits and modes of thought and feeling. The long and weak and flabby hands and fingers of the descendant of generations who have not labored with their hands are not unreasonably evidences of the fact. It requires two or three generations on the average to waste the hereditary, muscular strength of the sound country-lad after he goes to seek his 'fortune' in the town. But then dyspepsia appears, the kidneys degenerate, the circulatory mechanism weakens, and we soon find the generation of individuals living fifty years instead of eighty, having one or two children instead of ten, and finally in a few generations failing, and dying out. A generous habit of general outdoor muscular exercise year after year through life would make this story a very different one, and that more surely than anything else could.

Just how *muscular growth* in size and vigor occurs is not in all its details known as yet, but something of the matter has been made out. The degeneration of muscle when not used is the usual one of gradual shrinkage and absorption, perhaps preceded or accompanied by a metamorphosis partly into fat.

The invigoration of a muscular part of the body by its exercise, consists in an actual increase in the fiber-cells and in their number and tone; in a corresponding development of the sensory and motor nerve-mechanism related to them, in the *brain* most likely as well as in and near the muscles; and in a development of the vascular organs supplying these muscles. Secondly, as we have seen, many other parts have to develop to serve these primarily developed tissues. The circulatory, respiratory, digestive, and nervous system all are stimulated to a more active life by the new growth and vigor of the muscle-tissue throughout the body.

*Variety and change* are afforded both mind and body when the proper range of physical exercise is part of the daily program, and that not only for the body as a whole but practically for all its parts. Movements and change are essential elements of life molecularly and in every other way. In the mental sphere complete sameness means unconsciousness; in the bodily sphere it amounts to a defect. There is an ennui of the bodily organs and tissues and cells as well as of the mind. The tissues need change, need stimulating occasionally, work better when supplied with a certain variety of occupation, thus keeping them from too great specialization. The irritability of protoplasm is in a measure dependent on stimuli com-



ing to it from without. No means are at hand for affording to the whole organism this necessary variety and stimulation except muscular exercise of a proper intensity and as universal in bodily range as possible. In this direction lies one of the theoretic values of athletic games as opposed to mere routine calisthenics, exercises, or 'systems' however many muscles they may involve. Games by their essential competitive nature incite to *hard* exercise and offer endless variety within each game, while calisthenics, etc., by their lack of this incitement tend by repetition to become mechanical and finally to bore one by their sameness. As one often sees (football, rowing, basket-ball), some games tend to excessive exercise, but much more often the activity is too little or else too violent and too short. More benefit would be expected from a half-mile of brisk walking than from two miles of walking slowly, for the latter might not at all stimulate the circulation or the respiration or set the thermolytic apparatus of the body in action with its manifold activities of the skin, etc. etc. The muscles concerned immediately in the bodily movements would reap a benefit, but as we have seen this is only a minor part of the benefits of physical exercise.

Another aspect of the change-benefit, so to say, is the general one that attention to games or to outdoor natural activities takes one's mind away from its routine and makes life worth while. The restfulness of most vacations lies mainly in the change it affords. The advantage of changes into periods abounding in physical exercise is that in this case oftentimes both body and mind partake in the change, whereas else only the mind does so, the body suffering its routine ennui.

From such considerations the physiology of physical exercise becomes apparent,—it brightens up the metabolic fires of the whole organism as nothing else whatever can. Something like the foregoing are some of the general principles underlying a person's best mode of exercise:—it must be of such a nature as most to benefit these parts of the bodily and mental life. Hard it is sometimes to remember that sawing wood and haying and shoveling snow and tending the furnace and washing and sweeping and dusting even are quite as good forms of exercise physiologically and much more useful than the artificial modes of exercise the leisure classes employ. The only requirements are that a large number of muscles in every part of the body shall be actively employed in the right degree,—the more muscles the better, and the more nearly the degree is right for each individual at the particular time the better also.

How then can we best adjust the sort of exercise and its intensity and duration to the periods of life and to sex and to the common conditions of health and disease? Adaptation is so essential in these respects that we may well consider some of them in order.

In *childhood*, say up to the twelfth year, physical exercise needs only guidance and normally no incentive at all. The incentive is furnished instinctively by the irritability of the nervous system making it unnatural and in practice impossible for a normal child to keep his body still more than a very few minutes at a time save during sleep. The reason for this has been brought out in considering the neuromuscular mechanism and its kinesthetic nervous apparatus:—only by this incessant trying and practising of every possible movement of the muscles can the complex mechanism of nerve and muscle be normally developed into activity. A striking example of this principle was seen early in the last century when in the streets of Nuremberg suddenly appeared a youth of about seventeen who for at least fourteen years had been kept in a sitting posture strapped to a post in a perfectly dark and very low dungeon, being removed only at intervals of a week or two, drugged with opium, to be washed, etc. This famous victim of man's inhumanity, Casper Hauser by name, was doubtless normal when confined, but when abandoned in the city's streets fourteen or fifteen years later had no coördinated control over his muscles, and though of normal size and physical development, could scarcely walk or feed himself or talk, or do any other act which requires the experienced action of the neuro-muscular apparatus. He had the muscles, the chief nerves, the end-organs doubtless, but reflex activity in childhood had had no chance to develop these tools into a working and useful mechanism. The incessant movements of the child have then this indispensable function of automatically developing the means by which voluntary control of the body is acquired. If this tendency is absent, it must be encouraged but never repressed, save for some special reason or when it has gone beyond normal limits into nervous restlessness or chorea.

In childhood, partly because the bones are so plastic, care must be taken that strains do not occur. There is little danger of a general excess of activity, this matter regulating itself by the early fatigue which stops the movements before harm could come. Local strains, however, are not uncommon, and these must be carefully avoided lest some vital organ be permanently injured, especially the heart. It is the physician's business, too, to see that a child develops symmetrically, by being sure that games are played which will give every skeletal muscle, if no others, its share of exercise. Frequent rest and still more frequent change are essential in the bodily activities of children. Plenty of pure, simple food and country air will do the rest in raising a vigorous race.

In *old age* the conditions are obviously very different. Now exercise is become irksome oftentimes and the occupations, such as harbor the failing strength, more natural. But at this time, above

all, muscular activity is important, so as to stimulate the respiration and the blood-vessels and to help especially the alimentary canal to perform its daily indispensable part in the maintenance of life. The invasion of lime into the supporting and contractile organs, the bones, and muscles furnishes the key to the direction of bodily exercise late in life. The bones are becoming more and more brittle and the contractile parts of the muscles shorter as the tendons invade them. The arteries are becoming hard and less elastic, and this is especially important in the brain. The nervous system reacts less promptly and the senses often are less acute. Thus an old man's or old woman's exercise should be of the gentle sort wholly lacking in quick, forceful movements. It should be continued only to the very commencement of fatigue or even not so long; and more monotony may enter into it, as into the rest of the average aged person's life. Walking and gentle bicycle-riding are ideal forms of exercise at this period, the danger in these being that they will be too small in amount rather than too great, and too slow rather than too fast. The important thing is to have the man or woman of forty-five or fifty acquire the exercise-habit so that it will be in practice when most needed, ten or fifteen years later.

*Sexual differences* are much less marked than those which age requires. The chief principles here underlying are the comparative weakness of the female and her partial disability for a few days every month and during pregnancy.

During childhood the physiology of the girl is practically that of the boy—they differ more mentally and anatomically than physiologically. No valid reason is to be found, therefore, why girls up to eleven or twelve should not play the same games that boys of like age play and in the same way, and with the same intensity if they be so inclined. The more general and vigorous a girl's muscular exercise up to twelve, then the better especially if out of doors. Only by this means can a foundation of muscular vigor be laid which will last in an average degree through the usually more sedentary life of womanhood.

At the time of puberty and during menstruation afterwards a very different view of bodily exercise should be taken. It is then that the relative muscular weakness of woman shows itself, a weakness which is natural and normal and which demands adaptation at all times. This adaptation would seem to be satisfied in merely reducing the vigor and duration of the physical exertion.

In a thoroughly healthy woman, except just before and during menstruation, the ordinary modes of exercise appear to do no harm to the reproductive organs, but rather to strengthen them. During menstruation when the ovaries, uterus, and breasts are congested, physical exercise if at all violent is apt in obvious ways to do harm



by putting upon them and the pelvic and abdominal organs generally more violent movements than they and their fastenings will safely bear. Thus the congestions, instead of being lessened, are increased abnormally, often with perhaps permanent injury and derangement of the sexual and reproductive life.

During pregnancy, at least after its third month, when the ovum begins to gather mass, bodily exercise should be, like that of an old person, gentle but general and practised regularly. Digestion is thus kept at its maximum perfection, and vigor and an appetite for plenty of plain but strong food cherished. The gentle movements of the abdomen produced by mild exercise can hardly fail to stimulate the child growing in the womb and thus to call out reactions which lead to the early and normal growth of the motor mechanism. During lactation still more muscular activity cannot fail, normally, to benefit all concerned.

After the menopause the woman, so far as physical exercise is concerned, returns to the parity with the male, which existed in childhood. Quite as much as man, the woman of fifty needs an abundance of the right sort of exercise for the wellnigh omnipresent muscles of her body.

The *diseased conditions*, which require special adaptation of physical exercise, we need not stop to discuss in this relation. It is obvious that the various medical and surgical specialists do very much nowadays in the way of training their patients to overcome defects by the use of their muscles. These means range from the application of prismatic lenses to the eyes, to exercise the appropriate eye-muscles into normal action, to the carefully regulated hill-climbing which often benefits heart disease.

# MEDICAL AND SURGICAL PROGRESS.

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## CAUSE OF DEATH IN INTESTINAL OBSTRUCTION.

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By FREDERIC HAGLER, M. D., of St. Louis,

AND

MAJOR G. SEELIG, M. D., of the Editorial Staff.

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36. von Zwalenberg (*Annals of Surgery*, November, 1907, Vol. XLVI, p. 780).
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The symptom-complex of intestinal obstruction was first recognized and described many centuries ago. During the course of time the clinical conception of the older physicians has undergone many changes and modifications. Consequently there has been produced a voluminous literature on the subject. In this mass of literature much space has been given over to the consideration of etiology, symptomatology, diagnosis and treatment. Likewise numerous attempts have been made to formulate adequate definitions; and multitudinous classifications have been proposed relative to anatomical and pathological bases for the obstruction. But until a comparatively recent date little attention has been given to one of the most interesting and important phases of the subject—namely, the cause of death in intestinal obstruction. This state of affairs is probably explained by the seeming simplicity of the problem, for to the casual mind there could be no more obvious event than the inevitable death ensuing upon intestinal blockage. As a matter of fact, few subjects are more complicated and confusing. It is gratifying to note that in recent years several investigators, dissatisfied with older theories, have set about to determine the factors contributing directly to the production of symptoms and death. While conclusions and results have not been uniform, nevertheless much of the confusion surrounding the subject has been cleared away.



To account for death in intestinal obstruction several theories have been proposed:—

1. Inanition.
2. Disordered nervous mechanism.
3. Bacterial infection of the organism by passage outward of bacteria from the intestinal lumen.
4. Intoxication.

*Inanition.*—This theory has been generally discarded, although in as recent a work as Keen's "System of Surgery" it is declared that death is due to inanition, and explained that the earlier death in high obstruction, as compared to that in low obstruction, depends upon the more complete failure of absorption from the intestine in the former instance. Both clinically and experimentally we know that death does follow more rapidly in high obstruction; but we must look to other causes for the fatal outcome, because it follows too rapidly practically in all cases to be the result of starvation. In certain instances, early death in high obstruction may be caused by 'dessication' or 'dehydration' resulting, not from lack of absorption, but from a very rapid loss of body fluids through excessive vomiting. Draper has shown that the death is quite analogous to that produced in animals by excessive saline purgation and pilocarpine salivation. Hartwell and Hoguet lay much stress upon this factor of 'dehydration,' and show in animal experiments that life may be much prolonged by the intravenous or subcutaneous administration of large quantities of normal saline solution.

The great loss of fluid through excessive vomiting is often not a material feature in clinical cases and probably is directly responsible for but few deaths.

*Nervous Theory.*—Clinical evidence has been adduced to support this theory. The tachycardia, low blood-pressure, dilatation of splanchnic blood-vessels and the collapse of the patient, all point to a loss of activity on the part of medullary centers which is held to be brought about by a reflex disturbance from stimuli originating in nerve endings of the intestinal wall. While this is possible, it is also true that this same train of symptoms is seen in numerous conditions, and may arise from a toxemia of any cause. A slightly modified theory is entertained by Braun and Boruttau, who ascribe death to an anemia of the brain which progresses until the higher centres cease their activity and death results. The loss of body fluids from failure of absorption, the enormous outflow of fluid into the intestine, the persistent vomiting and the stagnation of blood in the splanchnic area, they believe cause the anemia of the brain, and consider death comparable to that resulting from gradual hemorrhage. True, there is some parallel, and admittedly there is a profound disturbance of cardiac, vasomotor and respiratory centers as death approaches, but it differs in no particular from that observed in the last stages of any severe sickness which is progressing toward a fatal issue. It is more likely a result than the cause of the factors responsible for the unhappy termination.

*Bacterial Infection.*—Normally there exist innumerable micro-organisms in the intestinal lumen, and in the event of an obstruction they are confined under conditions favorable to their growth. McClure called attention to this fact some years ago. Damage to intestinal mucosa may permit their passage outward either into blood-stream, lymphatics or free peritoneal cavity. This we know

from the development of peritonitis as a complication of strangulated hernia when there is no perforation or gross gangrene. Several German investigators have studied the question of bacterial invasion of blood and of peritoneal cavity with varying results. There can be no doubt that invasion either of blood-stream or peritoneum, or both, *may* occur in intestinal obstruction. But Hartwell emphatically denies that this necessarily follows, or that it is a vital factor. In a large series of animals he produced an artificial obstruction, and after death carefully made cultures from blood and various organs, with a large proportion of negative results. Thus it is shown that no matter what may be the rôle of bacteria within the bowel, or no matter how active they may *sometimes* become by penetrating the bowel wall and gaining access to the general system, this is not an essential factor either in causing the symptoms of the disease or in determining the fatal outcome.

A further point against this theory is seen in the fact that death occurs later in low obstruction than in high obstruction, whereas bacteria are much more numerous in the lower intestine than the upper portion of the tract. If bacteria played an important part, we should expect death much earlier in low obstruction. Still another argument against this view is the old experiment first done by Halstead and since repeated by many—namely, the exclusion of a low intestinal loop. Bacteria certainly are present in these isolated loops and yet the animals live indefinitely. The theory which holds bacteremia as the responsible factor seems untenable.

*Intoxication.*—This theory has much clinical and experimental evidence to support it, and all of the more recent workers hold this conception. While there is some diversity of opinion as to the source of the toxins, their character and the mechanism of their entrance into the circulation, and while some apparent contradictions have arisen from experimental work, there is happily now a tendency toward a unanimity of opinion.

Some years ago Vidal advanced the view that certain secretions of the upper intestinal tract possibly acted as poisons if stagnant and unneutralized by secretions of the lower intestine. Draper revived this theory and showed that the duodenal contents in obstructed intestine are toxic when injected into another animal. But he also showed that normal duodenal secretion is likewise toxic almost to the same degree, so that he really failed to prove his own point. He furthermore observed that the mucosa of healthy intestine, when macerated with duodenal secretion, destroyed its toxic properties. Hence he inferred that oral administration of intestinal mucosa should be of value in the toxic state dependent upon intestinal obstruction, and he actually reports having administered it to patients in at least two instances! In low obstruction there is certainly an opportunity for diffusion between the contents of the higher and lower intestinal loops with consequent opportunity for such neutralization as Draper conceives to be necessary. And yet death is quite as certain unless the obstruction is early relieved. His explanation of toxemia is hardly adequate.

To Murphy and Vincent the subject owes much, for aside from the value of their own contributions, their first paper which appeared in 1911 stimulated investigation on the part of others. Experimenting upon cats they arrived at the conclusion that death in intestinal obstruction is due to a toxemia which results from bac-



terial growth. They obstructed the duodenum in two places and then killed the animal in a few hours and studied the contents of the loop. They concluded that the toxic properties were due to bacterial products, and found that their absorption could be hastened by interfering with the venous return from the obstructed loop.

Whipple with his colleagues at Johns Hopkins soon came upon the field, and following somewhat in the lead of Draper's suggestion, thought to prove the death due to a toxemia which resulted from perverted activity of duodenal mucosa. He experimented upon dogs, and the general method was by doubly obstructing and then isolating a duodenal loop by gastro-jejunostomy. Bile and pancreatic juice and food products were thus excluded. Whipple found that in forty-eight hours or less the dogs died in a toxic state with symptoms similar to those seen in clinical intestinal obstruction—namely, rapid pulse, tremor, vomiting, weakness and collapse. He found the contents of the duodenal loop highly toxic and likewise the duodenal mucosa itself. His inference was that the duodenal mucosa under altered conditions develops a perverted function and produced the toxin. By repeated washings he cleared these loops of bacteria, but still produced the typical death. Hence he thought to disprove Murphy's claim for bacteria toxemia. He further supported his claim for the mucosa by destroying the mucosa of closed loops with fluorine and showing that under this condition death did not follow rapidly as before. He also introduced into closed loops the contents of closed intestinal loops of animals dead from obstruction, and found that death was not hastened thereby. Therefore he argued against the toxin being absorbed from the intestinal lumen, and interpreted this experiment as showing that the toxin is produced by and enters the circulation from the cells of duodenal mucosa. He and his co-workers carried out many experiments in immunizing animals to this toxin, also making many attempts to identify the toxin. In a late paper it is reported as having been definitely established as a primary protease.

Hartwell takes vigorous exception to the views of Whipple, denying that the duodenal mucosa has any specificity of secretion. He lays special emphasis on the loss of fluids, and insists that the primary factor in the toxemia is neither a bacterial growth nor a perverted function of mucous membrane, but a damage to the gut wall. He shows that by carefully obstructing, so as to produce a minimal injury, the length of life of dogs may be doubled, and he believes that the damage to gut wall is brought about by over-distention. The over-distention is caused by the retention of intestinal contents and by secretion of the intestine. The fluid secreted by the upper intestine is very considerable; in closed loops it may be of sufficient amount to cause interference with the circulation of the loop with damage to the gut wall in twenty-four to forty-eight hours. This explains the prolongation of life in animals by destroying the mucosa before obstructing loops, as was done by Whipple. German investigators have shown a retardation of absorption of potassium iodide and also of strychnine in experimental intestinal obstruction, so that it seems rational to explain on this ground the failure to cause an earlier death by enclosing toxic loop contents in a newly obstructed intestinal loop. Hartwell believes that there is no toxin



absorption until the mucosa is damaged by interference with its blood supply due to over-distention.

Murphy, in a later paper, claims, as did Hartwell, to disprove Whipple's views by showing that the toxins are not specific for duodenum, but may be produced in other portions of the intestinal tract or even in the gall-bladder. He again reiterates his original assertion that the toxin is bacterial in origin, but agrees with Hartwell as to the importance of the factor of impaired circulation.

The three views of the intoxication, demanding consideration are then:—

1. Murphy believes that symptoms and death in intestinal obstruction are the result of the elaboration and absorption of toxic substances from the obstructed intestine. He believes that the toxins are the result of bacterial growth, that they are not specific for any part of the intestinal tract. The toxic substance does not pass through a normal mucous membrane. Interference of the circulation of the obstructed intestine is an essential factor in the abnormal absorption.

2. Hartwell contends that death in intestinal obstruction is due to the absorption of a toxic substance as a result of damage done to the intestinal mucosa. This damage results largely from the trauma inflicted by the over-distention acting on the circulation, but possibly also by the chemical action of the digestive ferments stagnated above the obstruction. Such a damage having resulted, there occurs a bacterial invasion into the bowel wall with death of tissue cells, and in this process the poisonous substances are elaborated. The absorption of a poison from any source whatsoever, so long as the mucosa remains intact, is not a factor. The loss of body fluids is emphasized as a factor in the causation of death. The character of the toxin is undetermined.

3. Whipple and his co-workers believe that death after intestinal obstruction is due to the absorption of a toxin secreted by the intestinal mucosa, and that this toxic secretion can be derived from the bowel wall without a demonstrable change being present in the intestinal mucosa. The perverted secretion is held to be specific for the duodenum and high jejunum, and the toxin is lately held to be a primary proteose.

In certain essentials all agree. Death is due to a toxemia. In a toxemia two factors must be present, the production of the toxin and the absorption of the toxin. The degree of toxemia, that is, the character and severity of symptoms, depends on both factors.

The seeming differences in views of production and absorption of toxins are really not as striking as they appear. The theories of Murphy and Hartwell are altogether compatible. Hartwell simply does not go so far as Murphy, who says that the toxin is a product of bacterial growth. But to show that they are practically in accord we will quote first from Murphy, who says, "this toxic substance does not pass through a normal mucous membrane. *In the production of symptoms the factors which make this absorption possible are more important than the factors which produce the toxin.* Interference with the circulation of the obstructed intestine is an essential factor in allowing this abnormal absorption," and then Hartwell as follows, "*the essential factor in causing the symptoms and death in intestinal obstruction does not lie in the poisons per se, but in the production of the lesions which favor their abnor-*

*mal absorption*; the entrance into the circulation of poisonous materials occurs only when the mucosa of the bowel is damaged. This damage results largely from the trauma inflicted by the over-distention acting on the circulation."

Whipple's views do not so easily harmonize with the other two. Murphy disproves his claim for a specificity of toxin by showing that an analogous toxin may be produced in the gall-bladder and lower ileum as well as in the duodenum and upper jejunum. Hartwell emphatically contests Whipple's contention that a toxin may be secreted by an undamaged mucosa. But to quote again from Murphy, "the opinion of Hartwell and Hogue in maintaining that the severity of symptoms depends on the extent of damage to the intestinal mucosa is not necessarily opposed to that of Whipple and his co-workers in their statement that the toxin may be developed without great changes in the mucosa, for the reason that damage to the mucosa is essential to the absorption of the toxin as is proved by the fact that the toxin is not absorbed from the normal mucosa. Also, the terms 'damaged mucosa' and 'perverted secretion' may not represent different processes."

It may not be amiss here to emphasize the practical consideration deduced by Murphy—namely, that in the surgical treatment of intestinal obstruction, that portion of the intestine in which the mucous membrane has been damaged so as to permit of abnormal absorption should be resected rather than drained. Hartwell adds the practical point, that whenever there has resulted from the obstruction any considerable damage to the bowel wall above the constricted point, by reason of distention and circulatory changes, there is danger of serious symptoms arising from the absorption of materials resulting from these changes, and that therefore the more rapid emptying of the bowel through an enterostomy, after relieving the obstruction, may be a wise thing to do. Likewise death may be postponed by preventing dehydration by means of continuous hypodermoclysis. Finally, and most important of all, it is imperative to relieve an obstruction surgically as early as it is discovered.

A critical analysis of the various theories leads the reviewers of the subject to believe that most of the confusion and many of the recent difficulties have arisen out of the desires of investigators to fix upon some one certain factor as the cause of death. The problem of shock was long clouded by attempting to ascribe to it a single causative agency. It is well known that all these attempts failed. So it seems not unwise to ascribe the death of intestinal obstruction not to any single factor in a given instance but rather to a general organic compromise. None of the theories of toxemia is absolutely satisfactory. We may well believe that factors other than toxemia may be concerned; and in certain instances they evidently do play an important part. Bacteremia, toxemia and dehydration are entitled to most consideration. Seidel's researches suggest that in some instances death may even be brought about by an acute pancreatitis which results from a regurgitation of intestinal contents under the increased pressure. This is contrary to Coffey's experimental results. The reviewers have been engaged in studying certain phases of the subject for some time in the St. Louis University Laboratories and have found many points to be far from settled. The study is a fascinating one, and the recent advances in our knowledge show the value of correlating clinical problems of the ward with experimental studies in the laboratory.



## BOOK REVIEWS.

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DISEASES OF NUTRITION AND INFANT FEEDING. By John Lovett Morse, A. M., M. D., Professor of Pediatrics, Harvard Medical School; Visiting Physician at the Children's Hospital, etc. etc., and Fritz B. Talbott, A. B., M. D., Instructor in Pediatrics, Harvard Medical School; Chief of Children's Medical Department, etc. etc. New York: The Macmillan Company. 1915.

Morse and Talbott have ably presented a detailed description of the scientific basis of rational infant feeding in their book "Diseases of Nutrition and Infant Feeding." The many problems of this large and increasingly important subject are clearly and forcibly discussed in the five sections of the book:—

1. Physiology and Metabolism.
2. Breast Feeding.
3. Artificial Feeding.
4. Diseases of the Gastro-intestinal Canal.
5. Diseases of Nutrition.

The bibliography which follows along with the text is complete and up to date. The book is the last word on feeding and is not only valuable to the general practitioner and pediatrician, but extremely serviceable as a reference handbook to the students and research workers in this field.

The controversial matter is well handled and the conclusion clearly drawn. Chapter VIII on The Stools in Infancy is of particular merit and is recommended to every physician who feeds infants. As Morse says: "The examination of the stools is of the greatest aid in the diagnosis of the nature of disturbance of digestion in infancy. Without such examination the treatment of the disturbances of digestion is always unscientific and often irrational."

The importance of breast feeding is duly emphasized, but the most valuable contributions of Morse and Talbott are contained in the chapters on artificial feeding. The fundamental principle of fitting the food to the digestive capacity of the individual infant is the thesis of the work.

The percentage feeding is advocated as the most satisfactory way of determining the composition of an infant's food. Caloric calculations are used as a check in feeding—not as a basis. The discussion on Sugars is valuable. Lactose is shown to be the most suitable for the growth of the human organism. It is the sugar normally present in milk; it is more slowly and more completely absorbed and therefore more conducive to the development and persistence of the normal fermentative flora throughout the intestinal tract. The uses to which the more readily absorbed sugars, such as maltose and cane sugars are to be put, are clearly presented. In regard to proprietary foods, Morse and Talbott show that modification of milk can be made to contain everything which is in these foods, and therefore recourse to these expensive foods is not necessary. An excellent table of the composition of the most commonly used proprietary foods appears on pages 230 and 231 and a discussion of the various types follows.

The treatment of the diseases of the gastro-intestinal canal is



clearly presented and emphasis is laid on the treatment of disturbance of digestion by regulation of diet; and detailed description of the various changes and their indications are given. The last chapter of the book on Rickets and Infantile Scurvy presents the last word on these important constitutional diseases and is extremely valuable.

**PHYSIOLOGICAL CHEMISTRY.** A Textbook and Manual for Students. By Albert P. Mathews, Ph. D., Professor of Physiological Chemistry, The University of Chicago. Illustrated. New York: William Wood and Company. 1915. Price, \$4.25.

It would be well if the authors of our textbooks dealing with the clinical side of medicine would learn a lesson from the laboratory workers. These latter have departed radically from the style of ten years ago when textbooks were dry compilations of facts and observations, set forth in such manner that one might justifiably conclude that they had no relation to any other branch of human knowledge. Literary style found no place in these pages. "Facts, Sir, nothing but facts," was the essential thing. There is no better example of the change which has taken place in this attitude than Mathews' book. In turning over the pages one is scarcely aware that he is reading a textbook, so fluent is the style, so vivid the narrative. The problems of physiological chemistry are translated into the language of common speech, and physical chemistry is transformed from a mass of intricate formulæ to a series of lucid explanations. Metabolism is not a dull account of caloric values and endless chemical equations. To be sure, there are structural formulæ and equations, but only by way of explanation, for it is the subject of metabolism as a whole that the author desires to set forth,—its history and logical development from the work of Lavoisier and Claude Bernard down to the present day. Probably the most characteristic thing about the book is the author's faculty for putting things in their proper setting, and the ability to correlate his data, from whatever source it may be drawn. Anatomy, physiology, pathology, embryology, paleontology, all contribute their share towards the end sought, and this end, frankly stated by the author, should be the great end of all medical education,—to arouse interest, to stimulate curiosity and inquiry.

The final chapters of the book are devoted to laboratory work and practical analytical methods, many of which are of recent development.

**APPLIED IMMUNOLOGY.** The Practical Application of Sera and Bacterins, Prophylactically, Diagnostically and Therapeutically. With an Appendix on Serum Treatment of Hemorrhage, Organotherapy and Chemotherapy. By B. A. Thomas, A. M., M. D., Professor of Genito-Urinary Surgery in the Polyclinic Hospital and College for Graduates in Medicine; etc. etc., and R. H. Ivy, M. D., D. D. S., Assistant Instructor in Surgery in The University of Pennsylvania, etc. etc. With 5 Colored Inserts and 68 Illustrations in Text. Philadelphia: J. B. Lippincott Co. 1915. Price, \$4.00.

The clinical laboratory man usually labors under a great handicap. His services are at the command of practitioners, many or even most of whom have no knowledge of the difficulties of his task,

the inaccuracies inherent in many of the technical methods which he must employ, and the relative value of many of his tests. In short, on account of his entire lack of information, the practitioner is unable to interpret intelligently the work of the clinical laboratory. The present volume aims at a solution of the difficulty by placing at his command a book wherein is contained the practical phases of serum and bacterin applications in medicine. Theories and extended accounts of experimental research are omitted. The book will be of greatest use to those who, deprived of personal training in laboratory serology, would yet like to make use of this side of medical knowledge in an intelligent and discerning manner. Unfortunately the present day tendency in this regard is to trust to the biased statements of some manufacturer's 'working guide.' There will, however, always be some men who prefer first-hand information, and to such the present textbook on applied immunology can be heartily recommended. We cannot close this review without making special mention of the excellent chapters devoted to the diagnostic and therapeutic use of tuberculin. They contain much valuable information in concise form.

**DISEASES OF THE ARTERIES INCLUDING ANGINA PECTORIS.** By Sir Clifford Allbutt, K. C. B., M. A., M. D., F. R. C. P., F. R. S., Hon. M. D., LL.D., D. Sc., etc., Regius Professor of Physic in the University of Cambridge, etc. etc. In Two Volumes. New York: The Macmillan Company. 1915. Price, \$9.00 per set.

This is a truly monumental book, the study of which may, without much exaggeration, be called a liberal education in diseases of the circulation.

In manner of presentation, it has all the best qualities of the English School and is as delightful reading as Mackenzie's great book on the heart. The entire first volume and a portion of the second is devoted to arteriosclerosis in all its phases, the rest of the second volume being concerned with angina pectoris. The author's main thesis, to the expounding of which of the book is devoted, concerns the relationship between arteriosclerosis and hypertension; so far from hypertension being due to arteriosclerosis, the reverse is true in part. It is well known that cases of arteriosclerosis sometimes have a high, sometimes a low blood-pressure. They readily group themselves into three classes: the senile cases, the most numerous, in which the pressure is low; the toxic cases, in which the pressure varies; the cases resulting from long-continued hypertension, in which the pressure is high. This classification throws a flood of light on the whole subject and makes clear what otherwise remains obscure.

The therapeutic chapters do not lend themselves to summarization, but are among the best in the book. Conservative and based upon an extensive experience, they will be found widely useful.

**MEDICAL AND VETERINARY ENTOMOLOGY.** A Textbook for Use in Schools and Colleges as Well as a Handbook for the Use of Physicians, Veterinarians and Public Health Officials. By William B. Herms, Associate Professor of Parasitology in the University of California, etc. etc. New York: The Macmillan Company. 1915. Price, \$4.00.

Medical entomology is concerned with the study of insects and

arachnids as they relate to the transmission and causation of disease in man and beast and is, therefore, a specialized branch of the science of parasitology. Its importance to physicians resides in the fact that a variety of diseases is transmitted by the bites, stings, and contaminating visits of these small pests, not to speak of the direct distress often caused by their attacks.

The modern science of preventive medicine, to a considerable extent, rests upon a campaign against these infective insects, a campaign that can be successfully waged only as a result of a somewhat intimate knowledge of their life, habits, and history. Such a knowledge, it is the object of this book to impart. Well written, profusely illustrated, at once complete and concise, it will prove a valuable addition to the library of any physician interested in preventive work.

**A TEXTBOOK OF THE PRACTICE OF MEDICINE.** By James M. Anders, M. D., Ph.D., LL.D., Professor of Medicine and Clinical Medicine at the Medico-Chirurgical College, etc. etc. Illustrated. Twelfth Edition, Thoroughly Revised. Philadelphia: W. B. Saunders Company. 1915. Price, \$5.50.

It would be superfluous to enter into a detailed enumeration of the many excellencies of this standard textbook. The present edition has been thoroughly revised in keeping with our advancing knowledge. The new material embraces sections on Hypophyseal Obesity, Colon Bacillus Infections, Large-cell Splenomegaly, and Tuberculosis of the Thyroid Gland. In the treatment of typhoid fever the author still favors the milk diet instead of the more liberal diet, rich in carbohydrate, which has come into such wide use in recent years. He likewise takes a conservative view of the more recent claims in regard to the etiology of the rheumatoid and acute rheumatic affections. In these and similar instances the author never fails to set forth the various divergent views; in fact, a less frequent reference to authorities and a more vigorous personal stand on debated points would seem highly desirable.

**THE STARVATION TREATMENT OF DIABETES.** With a Series of Graduated Diets as Used at the Massachusetts General Hospital. By Lewis Webb Hill, M. D., and Rena S. Eckman (dietiti), With an Introduction by Richard C. Cabot, M. D. Boston: W. M. Leonard. 1915. Price, \$1.00.

The 'starvation treatment' of diabetes, as advanced by Dr. Frederick M. Allen, of the Rockefeller Institute, is undoubtedly a most valuable treatment. At the Massachusetts General Hospital it has been used for some time with great success, so that it seemed worth while to publish some of the diets and details of treatment that have been used there, as a careful control of the proteid and carbohydrate intake is of the utmost importance, if the treatment is to be successful.

It is still too early to say how far reaching and how permanent the effects of such a diet will be in the severe and in the milder cases of diabetes. So far it has seemed to work admirably.

To all who wish to give their patients the benefit of the treatment, this book may be heartily recommended.



**A NURSING MANUAL FOR NURSES AND NURSING ORDERLIES.** By Duncan C. L. Fitzwilliams, M. D., CH. M., F. R. C. S., Surgeon-In-Charge of Out-Patients and Lecturer in Clinical Surgery, St. Mary's Hospital; Senior Assistant Surgeon, Paddington Green Children's Hospital. New York: Oxford University Press. Price, \$2.00.

This book is designed as a sort of vade mecum for nurses who have had a minimum of training. It takes up the various problems from the practical side of actual management and combines with each chapter as much anatomy and physiology as is necessary to make the chapter intelligible. Considerable attention is given to first aid treatment and there is much space devoted to bandaging, fractures, and injuries. It should prove of much help to attendants at field and base hospitals, and to all those engaged in similar nursing work.

**LEGAL PRINCIPALS OF PUBLIC HEALTH ADMINISTRATION.** By Henry Bixby Hemenway, A. M., M. D., Fellow, American Academy of Medicine, etc. etc. Introduction by John Henry Wigmore, LL.D., Dean, Northwestern University Law School, etc. etc. Chicago: T. H. Flood and Company. 1914.

The relation between the law and the science of public health has always, at least in this country, been an unsatisfactory one. We have a wealth of sanitary legislation, too often drawn up by men knowing little law and less medicine. The result is a mass of unenforced and unenforceable laws on our statute books.

In this volume, Prof. Hemenway, whose life-work has been preventive medicine, takes up this mass of legislation systematically, showing us where we stand at present in regard to health laws and how the latter could best be amplified and amended. It is a book that should be carefully read both by health-officer and legislator.

**DIE ENERGIELEHRE DER BLUTGEFAESSE.** Von Dr. Ernst Homberger, Frankfurt, a.M. Wuerzburg: Verlag von Curt Kabitzsch. 1914. Price, 1.70 m.

This monograph is devoted to an attempt to show that the blood-vessels, especially the veins, take an active part in the circulation, both in health and in disease. The regulation of the circulation to fit the constantly varying needs of the organism is based upon a great variety of complex factors. One of the most indispensable of these, according to the writer, is the active enlargement of capillaries and veins, whenever the tissues require an increased blood supply. The discussion is largely theoretical and hypothetical but is none the less interesting.

**THE MEDICAL CLINICS OF CHICAGO.** Volume I, Number IV (January, 1916). Octavo of 221 pages, 33 Illustrations. Philadelphia and London: W. B. Saunders Company. 1916. Price, per year: Paper, \$8.00; Cloth, \$12.00.

Our opinion, after reading through this fourth number of the Medical Clinics, is little different from that which we gave in reviewing the second number of this series. Several of the cases presented in the present number are of unusual interest, yet we adhere to the belief that on the whole this method of presentation is wasteful and ineffective.

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## EDITORIAL.

### A FEW THOUGHTS AND A SUPERFLUITY OF WORDS.

Readers of medical journals and of those literary (?) journals that tamper with medical subjects in the hope of increasing the number of their subscribers, so great, indeed, is the desire on the part of the public to know enough of medicine to make modern conversation a lugubrious affair, must have been startled, perhaps amused, by the large number of articles of all shades and meanings on the subject of alcohol and the narcotics, meaning by the latter tea, coffee and tobacco. What their inferences have been we do not know, but if they had a normal brain,—as normal as is possible in this imperfect world,—we are quite sure they would agree with us that their readings have led them nowhere but into chaos—a chaos so dark and labyrinthine that only a large quantity of alcohol or one of the narcotics could bring on a complete forgetfulness of the futility of their efforts to see light where only Egyptian darkness prevails. One writer gifted with a vivid imagination, a facile pen, and a fanaticism that has been nurtured with care from a weakling into a forbidding giant, pounces on coffee because coffee has once upon a time upset the intricate mechanism of his abused stomach, just as carrots or a more aristocratic vegetable might have done. Another sees destruction of the human race even from a slight indulgence in tea, a third levels his battering-ram at tobacco, a fourth is enamored of tea and coffee, even of tobacco, but pronounces alcohol the arch-enemy of human happiness. They come, these articles, in avalanches; at times, when the authors are exhausted, in twos and threes; but this does not happen so often that we can say with considerable assurance that the well from which they draw their varied knowledge will soon run dry. All that they need, it would seem, is a theory, and then heigh-ho for a mad ride, a gallop, a hurdle-race, a double somersault, and great is the joy of the reader if the writer falls on a soft cushion, for unbroken bones means another article on the same lines next month and a fresh stimulus to the chaotic and lugubrious 'drawing-room talk.'

What we have just written may strike the reader as too flippant for a medical journal that makes some pretense to seriousness,

but in explanation of our attitude let us make it clear to the reader that under our frivolous exterior we are very serious indeed, in fact, almost tragical. A man has been known to laugh when his thoughts were melancholy; and while we hasten to assure the reader that melancholia is not sitting on us so unshakably that its talons cannot be loosened from our mentality, we must confess that the problem of alcohol and tea, coffee and tobacco, as presented to us in most medical journals with the masterly attempts at explanation and solution, is a very disturbing one and at times makes our thoughts so brown that in the dusk of evening they might be mistaken for black. And who in his right senses would not be affected in the same manner by the multitudinous theories and the vapid reasonings? It is not that the author has no lucid moments when he hauls the narcotic he thinks the most baleful one to the gallows to be hanged amidst his intense derision and denunciation; to say this would be carrying our prejudices too far. He undoubtedly has his lucid moments, and due credit should be given him for them; but where he errs is in letting his personal feelings dominate the sanity of what should be his thought, if he hopes to achieve results with his readers. The personal note is a good quality, if not carried too far, in articles of a purely literary nature, but in a medical article it should be suppressed and, especially, should the leashes that hold it in check be taut opposite the problem of alcohol and those narcotics which are on our table daily and which have become through custom or habit part and parcel of our existence.

That the attack on the use of alcohol and tea, coffee and tobacco should each year have more and more enthusiastic upholders may at first seem to those who have not given the matter much thought as evidence that the deleterious qualities of these stimulating 'foods' are proved beyond a doubt. That this is not the case in a scientific sense is the fact that our knowledge, based on science, is still in that embryonic stage where doubt creeps in as to whether the experiments now in progress in the laboratories are really applicable to man. What is undoubtedly true, and this is not knowledge gleaned from any experiments effected in the laboratory, is that the injurious qualities of the stimulants which are to-day under the ban of adverse criticism are altogether due to an over-indulgence, which so long as human creatures are human, too human, will obtain in many instances. The man who can take one drink has arrived at that enviable stage in his education when he knows how to relax, and the man who can drink one cup of tea or coffee, or smoke occasionally, and then hold his desire for more in check, is the possessor of a judgment that is of benefit to him. If the stimulants we have mentioned are swarming with those death-dealing qualities with which the writers say they are, then a very limied quantity of each would be a poison. But this is not true, since in too many instances the sane use of them results



in a physical and mental relaxation that has nothing objectionable about it or harmful to the system, except in the thought of some easy-chair philosopher whose mind, bathed in the turbid waters of puritanism, is unaware that modern civilization has declared that all human beings should be machines whose wheels must revolve despite considerable grating.

In the various social movements which are at present doing effective work in this country, there is a tendency, due perhaps to over-enthusiasm, to preach too intensely the gospel of Uplift. Directly a member of any organization becomes aware that a number of people are not of his exalted opinion and have not lived his life, he thinks a field has been opened up for his propaganda work, and the personal note is thrust into his endeavors to so great an extent that he loses all idea of what constitutes a judgment out of which might possibly issue some benefit to mankind. He may be a good man in every conceivable sense of the word, but if obliquity warps his point of view,—and obliquity is the one great danger that is a continual menace to his sane outlook,—he is a bad preacher. Physicians are not exempt from this charge, for they, too, have at times been guilty of falling into the error of condemning all forms of relaxation that do not appeal to them. Not being athletes—and who by the way would employ an athletic physician?—they inveigh against athleticism: sometimes it is true for medical reasons which cannot be questioned, at other times because they think their pills or powders a better tonic; and not being, as a general rule, given to the habit of spending their office hours in saloons, they too often see only one side of the alcohol question—the drunkard. As regards smoking they are more lenient, but here again, when they join the ranks of uplifters, they shout as loud as the others, though it must be said that they succeed in making headway more readily than do those who are not physicians, since nothing succeeds so well in propaganda work as a superficial or deep injection of science into ‘talks’ for the people.

A witty Englishman has recently said that Americans are altogether too much given to the art of intestinal gardening; by which he meant that we paid too much attention to our stomachs and, let us hope, he also meant our bowels. And though there may be a degree of exaggeration in the statement, is it not a fact that we are continually suppressing a natural desire for natural food and substituting something ‘just as good’ which has been created through the ingenuity of some enterprising manufacturer? Think of the ‘foods’ with which this country is flooded that are credited with virtues over those of meat and vegetables! And think of the ‘drinks’ that have been thrust upon us to take the place of the alcoholic beverages! Yes, indeed, the cult of intestinal gardening is with us; but let us hope the time is far distant when the ingenuity of the manufacturer will give birth to a cigar or cigarette that will have none of the toxic qualities of which we

hear so much nowadays, but only the supernal virtues peculiar to a mixture of alfalfa and liquorice.

P. S.

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### BOOKS AND AUTHORS.

If it were possible to put Professor G. T. W. Patrick's "Psychology of Relaxation" (Houghton Mifflin Company, Boston) in the hands of every physician with the request that he read it leisurely and with an appreciation of its excellent points, a complete understanding of what relaxation is and why some people resort to play, some to laughter, others to profanity, and still others to alcohol, when the desire comes over them 'to break away' from their exacting vocations, would be effected. Critics, both harsh and mild, of those amongst us who have been 'natural' in so far as they have quit work when mental exhaustion has beset them,—quit work for an hour or so, or for perhaps a shorter time just to get back to their normal state,—will get a jolt from this book and will realize that their criticisms of the man who refused to be a machine at the expense of his normal mentality and who unscientifically solved the problem, despite withering and scornful remarks, were very puerile indeed, and should be consigned at once to that dusty lumber-room where lie in peaceful slumber so many cherished opinions of the past. Not to use the exact words of Professor Patrick when he dwells on the necessity for modern man to follow some means of relaxation to remain healthy and normal,—the words are in each chapter and are too numerous for exact quotation,—it will be just as well to give the reader the gist of the author's thought, and this is that so long as we cannot change the manner of life as it obtains to-day in all our large cities—the demand put upon us for constant work, our many social duties and our unceasing educational efforts to become more and more civilized—we cannot do without some form of relaxation, whether it be going to the 'movies,' indulging in profane swearing, or in alcohol, or in some form of sport, that is play, and remain healthy, mentally and physically speaking. Civilization having insisted on all sublunar beings of superior intelligence being machines, there must be a safety-valve for the emission of steam, and this can only be beneficially effected by the forms of relaxation which have already been mentioned. In the book before us there is no mention of the warnings which are ever on the lips of some physicians when they wish to frown down the natural exuberances of man,—no gloomy view of what will become of our hearts, our kidneys and our stomachs. And this is its best asset, for by a complete omission of prognostications which would act as cogs to the revolution of the wheels of what is a natural manner of living, we get a joyousness, an optimism and a genial philosophy that are most important if we would live as normal human beings.

P. S.

## ORIGINAL ARTICLES.

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### ALCOHOL AND NARCOTICS FROM THE PSYCHOLOGICAL POINT OF VIEW.

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By G. T. W. PATRICK, Ph. D., of Iowa City,  
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In an autobiographical sketch by Alexander Irvine in *McClure's Magazine* for June, 1911, the writer gives a picture of a poor family in Ireland. There was no money or food in the house. The father had that day half-soled a pair of shoes. The little girl was sent for the money for the shoes and was directed to buy a six-penny loaf, three ha'pence worth of tea and sugar, and half an ounce of tobacco. "The tea kettle," says the author, "always sang of hope. It was the harbinger of the thing which was most indispensable in that home of want,—a cup of tea. If it came to a choice between bread and tea, we went without bread."

This is a typical case and it presents the problem of stimulants and narcotics in a definite form. This poor family was in need of nourishing food to furnish a supply of daily energy, and to renew constantly wasting tissue. So far as is known, tea and coffee supply no energy and renew no tissue. Whence, then, the persistent desire for them? If this father had lived in England or in Germany and had worked in his shop, he would perhaps have stopped on his way home and had a glass of beer or ale, and if the family had lived in America, the cup of coffee for breakfast would have replaced the tea.

So we have the problem of tea, coffee, tobacco, and alcohol—and to the psychologist it presents itself in this way,—Whence the universal and persistent desire for these things? It will at once occur to the reader that no adequate answer to this question has yet been given and that until this question is answered, no satisfactory progress can be made in dealing with the problem of the use and abuse of stimulants and narcotics.

It is strange that in all the great mass of writings on this subject, so little attention has been given to the psychological problem, which is fundamental to the whole discussion—namely, the problem of the cause of the desire for tobacco, alcohol, tea, and coffee. We have been accustomed to deal very superficially with this question.



Tea and coffee, we say, are luxuries. Tobacco is a habit, and alcohol is a vice. But as soon as we reflect that the American people are now consuming annually about two thousand million gallons of alcoholic liquors, half a thousand million pounds of tobacco, a thousand million pounds of coffee, and nearly a hundred million pounds of tea, we see that such answers are childish. We see that it is not at all a question of luxuries or of habits or of vice, but a prosaic question of demand and supply, and the demand is rooted somewhere in the brain cells of human beings.

There are many other powerful human desires, but the others can be explained. Bread, meat, milk, butter, eggs, renew wasted tissue and supply depleted energy. We desire food, because without it we die. Sleep is also needed, and air, and water, and these things we desire. Then there is another powerful human desire which presents great social problems, the sexual desire, but the place of this in human economy is at once apparent. Without it, the race does not survive. Sugar is another thing for which there is a strong desire, especially among the young, and the stream of pennies, nickles, and dimes that flows to the confectioner's and to the soda fountain attests it. But sugar is quickly converted into energy in the human machine and the desire for it is not hard to understand.

Hence we see that certain universal desires, such as the sex desire, desire for food, water, sleep, sugar, etc., present no difficult problem to the psychologist, while certain other desires, almost equally universal and equally powerful, do present a very difficult problem indeed, and these are the desires for alcohol, tobacco, tea, and coffee.

How can we determine the cause of these desires? Clearly the problem is less simple than has been supposed. We must understand first the physiological action of these drugs, for alcohol, tobacco, tea, and coffee may all properly be called drugs rather than foods. Second, we must understand the psychological causes which make the physiological effects desirable and which establish the craving. Third, we must understand the social conditions of our times which accentuate the desire for these drugs and make them social problems. Physiology, psychology, and sociology must, therefore, all contribute to the final answers to these obscure problems of narcotics and stimulants. It is mainly with certain psychological aspects of the matter that I shall be concerned in this paper.

Let me say at once frankly that all psychological discussion of these drugs must rest upon the accurate determination of their physiological action, and that the physiological data in respect to tea and coffee are still insufficient to enable us to base any final conclusions upon them. To some extent also this is still true of alcohol. Of course, many experiments have been made with tea

and coffee and many results published, but they are inadequate and still unsafe to build upon. A very careful series of experiments was made by Dr. H. L. Hollingworth, of Columbia University\*; but since these researches were financed by the Coca-Cola Company, one hesitates to use the results as a basis for any psychological theory, no matter how careful the author may have been in his experiments and conclusions.

In general, however, Dr. Hollingworth's experiments seem to show a stimulation of mental and neural processes, as a result of doses of caffeine of from one to six grains, without any later depressing effects. Older experiments, such as those of Kræpelin, are also insufficient for psychological conclusions, owing to defect of experimental methods.

The popular impression seems to be that tea and coffee speed up the psychophysical mechanism, increase mental efficiency, drive away fatigue, banish sleepiness, and increase the lucidity of thought processes. This popular impression is of little value, for these effects are often attributed to alcohol and some of them to tobacco, although we now know that alcohol and tobacco have for the most part the opposite effects.

If, however, tea and coffee had the above stimulating effects, this fact would be of little aid to us in understanding the strength of the desire for these drinks. We have no analogies which would enable us to understand how a mere speeding-up effect would be the ground of so universal a desire. Daily observation fails to show us any strong desire for accelerated mental action on the part of the average human being. On the whole, he prefers drugs that will put him to sleep, rather than those that will wake him up.

It is conceivable that economists, philanthropists, or employers of labor might wish for a drug which should wake up the laborer or increase his efficiency, or lessen his desire for sleep, but that the man himself should have by nature a desire for such a drug, or should find a continued pleasure in its use, is hard to understand, nor would it be possible apparently to explain any such situation by the action of natural selection. It is, of course, evident that no drug can actually increase an individual's total efficiency. It might indeed appear to do so by a more rapid release of energy or by a temporary speeding-up effect, but there is nothing here which could explain the persistent desire for these drugs or the comfort derived from them. It is much more probable that in respect to the so-called stimulating effects of tea and coffee, we are dealing merely with secondary phenomena and that the desire for them, or the satisfaction derived from their use, is due to other causes.

In the case of alcohol and tobacco we are not so much at sea.

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\*The Influence of Caffeine on Mental and Moral Efficiency. (Columbia Contributions to Philosophy and Psychology, Vol. XX, No. 4, April, 1912.)

The physiological action of these drugs, especially of the former, is better known. They are both narcotics and depressants and their action is in general simply toxic and inhibitory. The question is not whether the inhibitory action of alcohol and tobacco has been absolutely determined beyond dispute. Nothing can be determined beyond dispute in a sphere in which human passion and prejudice are so strong as they are in all that relates to alcohol and tobacco. It is merely a question of whether the experimental evidence for this action is sufficient to warrant the psychologist in working upon this basis to establish a theory for the desire of these drugs, and there can be no doubt that the evidence is sufficient for this purpose.

How, then, may we explain the almost universal craving for narcotics and depressants? Alcohol effects a slight paralysis of the whole cerebral machinery. It acts as a rough intruding agency among the delicate nervous elements of the brain and, although its action is no doubt diffusive rather than selective, its effects are most felt in the so-called higher and more recently developed areas, because these higher centers, since they are more recently developed, are less stable and are therefore the first to suffer from such an intruding agency.\*

Alcohol thus acts directly upon those brain centers which are put under the heaviest strain by the conditions of our modern strenuous life; those which are most taxed by our daily life of work; those associated with the peculiar mental powers upon which advancing civilization depends, especially the power of attention, concentration, abstract thinking and analysis. These brain tracts are most subject to fatigue and it is this fatigue which is temporarily and artificially relieved by the narcotizing effect of alcohol.

Alcohol thus puts a temporary quietus upon the higher controlling brain centers and in this way sets free the older and more basal centers. It liberates the individual, sets him free temporarily from the bondage of the everlasting restraint which advancing social demands require. It dulls his power of self-control, of concentration, and liberates his speech, and his older and more primitive instincts and emotions. Alcohol, therefore, is an artificial means of relaxation. It is a means of release from the burdens of the modern strenuous life.

From this point of view the world-wide desire for alcohol and

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\*Compare the recent publication of the Nutrition Laboratory of the Carnegie Institute, "The Psychological Effects of Alcohol," by Raymond Dodge and F. G. Benedict. It is there shown that the accelerating effect of alcohol upon the pulse rate is due to the partial paralysis of the cardio-inhibitor centres, and these are believed to be of later development than the accelerator. That the lower motor centres appear in some cases to be more depressed than the higher intellectual centres, is thought to be due to the power of autogenic reinforcement possessed by the latter, which occurs to modify the effect of alcohol. (See pp. 241, 246, etc.)

For a fuller discussion of the theory, see the present author's book, "The Psychology of Relaxation," Chapter V.



tobacco cease to be altogether an enigma and become quite natural. These drugs serve as a means of relaxation and the desire for them is just as intelligible as the desire for any other form of relaxation, such as play or sport or the weekly magazine, or the moving picture show or the prize fight or the opera or theatre. Work is only a part of life. Play is the larger part. Work involves a serious tension and strain upon certain specific parts of the brain, those connected with sustained voluntary attention, which is the condition of all work, and those connected with thought and analysis and abstraction and concentration. These parts of the brain, therefore, suffer constantly from fatigue and demand rest. During sleep they get complete and almost absolute rest, but we sleep not more than eight or nine hours out of the twenty-four. It is impossible that these higher brain centers should be working during all the other fifteen or sixteen hours. Speedy collapse or insanity would result. Indeed, the larger part of this time must be spent in some form of relaxation. Some kind of play or sport or rest or recreation will inevitably fill up a large part of our working day, or else some form of so-called work which is itself interesting and does not tax too severely our powers of voluntary attention.

In the swift age in which we live there is a tendency for work to infringe on the hours which should be given to play. There is thus a tendency toward chronic fatigue of the higher brain and a growing desire for any artificial means of relaxation. Alcohol and tobacco are a cheap and easy means of rest and relaxation. They simply put to sleep in a measure the higher brain centers while allowing the needed activity to the lower ones. Dope thus accomplishes what nature intended to be accomplished by healthful and normal forms of relaxation, and one has only to experience for a few times the feeling of release which these drugs effect to desire a repetition of the effect.

No one puts much confidence now in the alleged action of alcohol to increase one's mental brilliancy. The subject often feels a kind of psychical elation and may imagine that his mental efficiency is increased, but too well his companions know that it is below the normal—that he is not himself, that he is even making a fool of himself. Coffee perhaps may make an after dinner speaker more brilliant but alcohol never. He only seems to himself to be especially brilliant.

Meanwhile the relentless figures of the psychological laboratory have shown that efficiency of every kind, physical and mental, is decreased even by small doses of alcohol, while the same is loudly preached and far more effectively by the placards now posted about the buildings of great industrial works.

Drinkers will smile at the reports of psychological laboratories on the damaging effects of alcohol, but the smiling ceases suddenly

when the workers in a great steel plant see the following sign posted:—

"In making promotions in all departments of the plant, superintendents of departments and foremen will select for promotion only those who do not use intoxicating liquors."

Experience has shown that temperance sermons have little effect in decreasing the desire for alcohol or its use. The promise of future health or long life has little restraining force with the average man, but his interest in his pocket-book is very real and has a compelling power. The recently discovered fact that alcohol lessens efficiency, which is the modern god of Americans, and consequently impoverishes the pocket-book, is likely to do more for the cause of temperance than all the efforts of temperance reformers. Once let a fixed association be formed in the public mind between alcohol and inefficiency and the battle has been nearly won. Perhaps nothing better has happened to the cause of temperance than the coining of the word 'booze.' The poetical associations called up by the goddess of wine vanish and instead come pictures of inefficiency and imbecility and alcohol is damned. No one cares to drink 'booze.'

In respect to tea, coffee, and tobacco, language may do a similar service to humanity by getting the word 'dope' associated with them in the popular mind.

A long list of experiments in physiological and psychological laboratories has shown that alcohol in both large and small doses decreases with fateful regularity all kinds of efficiency, both mental and physical. Whether in typewriting or typesetting or in mountain climbing or in pistol practice or in arithmetical computations, alcohol has been shown to exert a damaging effect, to diminish accuracy and decrease speed, and to lessen the amount of work accomplished.

Life insurance companies welcome the abstainer, not from sentiment or tradition but as a result of statistical researches. Arctic and tropical explorers, engineering parties, foremen and employers of labor, training-coaches of athletic teams, all discourage or prohibit the use of alcohol so long as there is work to be done or games to be won. Social workers look with dread upon the havoc done by alcohol in contributing to intensify the problems of crime, pauperism, and feeble-mindedness. Physicians find it of less and less value as a therapeutic agent and more and more a cause of lessened resistance to disease.

The final conclusiveness of these researches has been questioned, and it is true that there are many possible sources of error in the laboratory tests. Much interest has therefore been aroused by the series of rigid experiments now being carried out by the Nutrition Laboratory of the Carnegie Institute. The first results of these

researches have now been published and they have confirmed thus far the previous studies. The depressant action of alcohol has been verified, and a "clear indication of decreased organic efficiency as a result of moderate doses of alcohol" has been shown.

But after all, while the toxic and depressant action of alcohol is of the greatest interest and while the evidence increases that alcohol is an enemy of society, still the question of greatest present moment is the psychological problem of the cause of the world-wide and age-long desire for alcohol and the increasing modern longing for alcohol, tobacco, coffee, and tea. For it is only by getting at the roots of the matter, by finding out the reason why these drugs are desired, that we can hope really to solve the social problem of stimulants and narcotics. If these things are evil in their effects, the evil can be remedied in the final analysis only by removing the desire or satisfying it by providing some healthful substitute.

I have tried in this paper to show that the desire for alcohol and tobacco, and perhaps also for coffee and tea, is due to the fact that they are artificial forms of relaxation, welcomed in this tense and strenuous modern age when the strain upon the higher and more recently developed brain centers is so great. By artificial means these drugs produce the same psychophysical state as is normally produced in play and sport, which relieve the higher brain centers by a return to simpler and more primitive forms of behavior. A study of adult sports shows that those sports which afford the most complete relaxation and recreation are forms of activity racially old and familiar and hence easy and restful. They involve not the higher and newer brain tracts but the older and more basal ones. Hunting, fishing, camping, boating, and all the many forms of outing and football and baseball and horse-racing and prize-fighting and dancing are familiar illustrations.

As the tension of our modern life increases, so the demand for relaxation increases, both of the natural and the artificial kinds. We can understand therefore our modern amusement crazes, our dancing craze, our motoring craze, our golf craze, our moving picture craze, etc., and we can understand likewise the ever increasing demand for alcohol and tobacco. The demand for cigarettes in the trenches in the European war is almost pitiful, and the fearful intensity of the strain under the conditions of modern warfare makes the demand wholly intelligible. But it is, of course, a temporary expedient, and when this emergency, or any emergency is past, the habit persists, and it is the whole social situation which we have to consider. The future is very dubious for any race of people which has to depend upon drugs to establish a proper psychophysical equilibrium. Tobacco, alcohol, tea, and coffee have a momentary harmonizing effect, but what will be the result in the long run of this perpetual doping of the higher brain, not to speak here at all of toxic effects or of the social results of excessive use?



The problem, therefore, as we see, goes deeper than considerations of individual health or even of the present social welfare. It is a question of the welfare and the progress of the race. It is said that Gladstone was accustomed to bemoan the lack of intellectual progress of mankind in the last two or three centuries. Others believe that there are many signs of physical decadence. Are we definitely in position to say that racial development has not been retarded by the accumulative effects of tobacco and alcohol? As long as one sex only uses these drugs, the damage is greater to the individual than to the race. When both sexes and all the people use tobacco, as among the Turks, the racial damage may be enormously increased.

At the present writing, it is highly probable that such a general use by both sexes and all the people of moderate doses of alcohol would result in racial damage that would be catastrophic. And we shall derive small comfort from the theory of the non-heritable character of acquired traits, for these toxic drugs may have directly or indirectly a damaging effect upon the germ cells.

## THE HEREDITARY TRANSMISSION OF DEGENERACY AND DEFORMITIES BY THE DESCENDANTS OF ALCOHOLIZED MAMMALS.

By CHARLES R. STOCKARD, Ph. D., of New York,  
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### INTRODUCTION.

A little more than two years ago the author\* recorded experiments which had then been running for three years and seemed to show a definite injury of the germ cells by treating mammals with the fumes of alcohol. This injury of the male germ cells is of such a nature that an alcoholized male guinea-pig almost invariably begets defective offspring even when mated with a vigorous normal female. At that time it was also shown that  $F_1$  animals, the offspring of treated parents, though themselves not treated, had the power to transmit the defective condition to their young, and such  $F_2$  young were equally if not more defective than the immediate offspring of the treated animals.

In 1914 in a short abstract I showed further\*\* that the offspring from  $F_2$  individuals were apparently more defective than their parents and were often grossly deformed. One case was recorded of the occurrence of a litter of two  $F_3$  animals, both of which were extremely weak and neurotic, showing a condition suggesting paralysis agitans, and further than this the two animals were typical anophthalmic monsters. The eyes were completely absent, no optic nerve or optic chiasma or visible optic tracts along the tuber cinereum could be found on a careful gross examination of the brain. The two animals were produced by parents ( $F_2$ ) that had never been treated with alcohol, the four grandparents ( $F_1$ ) had also not been treated, while the *three great grandfathers* had been alcoholized and the three great grandmothers were normal untreated individuals.

Defective eyes and absence of one eye or both eyes have been frequently met with in the experiment, as well as the peculiar nervous condition, and these symptoms are to be considered indicative of the injury or change induced in the male germ cells by the experimental treatment, which in the above case was transmitted through

\*The Effect on the Offspring of Intoxicating the Male Parent and the Transmission of the Defects to Subsequent Generations. (*Amer. Naturalist*, 1913, Vol. XLVII, p. 641.)

\*\*A Study of Further Generations of Mammals from Ancestors Treated with Alcohol. (*Proc. Soc. Exp. Biol. and Med.*, 1914, Vol. XI, p. 136.)

three generations. No question could remain as to the action on the germ cells, as only male ancestors had been treated; every female of the line was an untreated animal.

This abstract called attention to the fact that there was a tendency for the results to differ in subsequent generations from treated males as compared with the descendants of treated females; but not enough data were then present to offer any explanation of these differences and a consideration of them will be undertaken in the present paper.

At that stage of the experiment it was also difficult to offer an exact analysis of the mode of transmission of the defects and the type of injury induced by the alcohol treatment, since the total numbers were not large and the  $F_2$  animals had only a few matings, while further generations had not become available for breeding.

The same experiments have now been continued for more than five and one-half years and a number of animals have been used, over 1,300, which cover the behavior of five generations and supply data of sufficient extent to allow a more thorough analytical consideration of the heredity problem concerned.

Experiments of this nature on mammals are fraught with many difficulties, slowness of breeding, small size of litters, difficulty of handling, etc. Yet such material offers one very great advantage in that the quality of the offspring and generations studied is of such a complex that one is enabled to detect indications of rather slight injuries or changes in the material carriers of heredity which would not become evident on lower forms with less diversity in their methods of behavior and structural appearance. In other words, we take it that such conditions as are spoken of as racial degeneracy in man and mammals are often very difficult or even at times impossible to detect in lower forms.

These conditions are for many reasons thought to be inherited. If so, their inheritance must be due to a pathological condition of the material carriers of heredity, the chromosomes, or what not, since they are not normal states and, like diseases, are constantly arising in normal families on account of one or another form of intoxication. Is it possible then to produce such a racial degeneracy artificially by treating only one generation of the animals and by so doing observe a pathological behavior of the carriers of heredity? Arguing from analogy there must be pathological heredity due to diseased or altered chromosomes in the germ cells just as truly as there is a known pathological behavior of every other organ and tissue of the animal body.

It becomes then a problem to study the possible methods of modifying the chromosomes or carriers of the inherited qualities of organisms in order further to analyze their normal physiological behavior; in the same way that experimental embryology has been



able to supply so many valuable clues to the normal processes of development.

In the following pages we believe the facts indicate that individual guinea-pigs are now living in this experiment that have had the carriers of hereditary qualities, the chromatin, of their germ cells injured for a longer time than five years. And during this time they have given rise to offspring of more or less degenerate or deformed type, and in some cases these offspring have passed this modified chromatin on through three generations, all of which contain pathological chromatin and show some somatic defects and deformities as an index of their tainted chromatic ancestry. Modified chromatin has been living in the experiment for more than five years in six different generations of animals as a result of the alcohol treatment on the one original,  $P_1$ , parent generation.

We have tried to regulate every controllable source of error, and there can be no doubt that the conditions are brought about in the way described. Could the degeneracy which is so pronounced have previously existed in the stock? This question has been controlled in the first place by the use of two entirely different stocks from different sources and obtained one and one-half years apart, the first in the fall of 1910 and the other in the early winter of 1912. The responses of the two stocks to the experimental treatment have been identical. As a second method of control every animal has been tested by one or more normal matings before being introduced into the experiment, and only those giving normally strong offspring have been used. A further crucial control is the constant mating of normal untreated animals from both stocks under identical cage conditions with the experimental individuals. These animals continue to breed normally until very old, when they gradually become sterile. But none has ever given rise to a defective or deformed individual, and the rate of mortality of the young indicates the average healthy condition found in normal guinea-pig breeding. There is a striking contrast between the records of these normal young and the mortality record, the frequency of easily recognized nervous symptoms of degeneracy, and the prevalence of gross deformities in the experimental alcohol races.

The external as well as internal factors are to be considered not only in individual or embryonic development, but also in heredity. And the present experiments now demonstrate for mammals that either the spermatozoon or the ovum may be experimentally injured or modified by alcohol in such a manner as not only to give rise to (abnormal) subnormal development in the resulting embryo, but the effects of the injury may be transmitted from generation to generation, until an affected line actually fades out through degeneracy and sterility as a result of the transmitted condition.

## MATERIAL AND METHODS.

The animals used in the experiments have been ordinary vigorous guinea-pigs of large size, particular care being taken to select animals less than one year old to begin with and good breeders.

At the beginning of the experiments alcohol was given along with the food, but the animals ate less and the food usually disagreed with them. It was then administered in diluted form by a stomach tube; this method was even more unsuccessful, disturbing digestion and seeming to upset the animals considerably. It is certain that alcohol given to animals through the stomach deranges their appetite and digestion to such an extent that the experimenter is unable to determine whether the resulting effects are due to the alcohol, as such, or to the generally deranged metabolism of the animal. When given in drinking water they take little or none of the water and the treatment is insufficient. For these reasons an inhalation method of treatment was resorted to early in the study, and, as far as experience goes, it has no serious disadvantages and does not complicate the conditions of the experiment.

This method may be merely described in brief for the convenience of the reader, since it has been fully recorded with illustrations of the fume tanks in previous publications. A fume tank of copper is made of sufficient size to supply breathing space for four or five guinea-pigs at one time. The tank has four outlets, so that a definite amount of fumes may be passed through in a given time and the ventilation controlled. In this way each animal could be given a definite measured dose. The individuals, however, differ so much in their resistance to the treatment that it has been found better to treat all to about the same degree of intoxication. Such a physiological index is more reliable, since every animal may be affected to the same degree each day. For this purpose the animals are placed in the fume tank on a wire screen, and absorbent cotton soaked with alcohol is placed beneath the screen, so that they inhale the alcohol fumes arising from the cotton to saturate the atmosphere of the tank.

Ether was given in a similar manner. The animals are much more readily overcome by these fumes and must be carefully watched while inhaling even the most dilute doses.

To avoid handling the females during pregnancy, special treating cages are devised. An ordinary box-run with a covered nest in which the animal lives is connected by a drop-door with a metal-lined tank, having a similar screen arrangement, etc., to that of the general treatment tank. The pregnant animal may be driven daily into the tank and thus treated with alcohol fumes throughout her pregnancy without being handled in any way that might disturb the developing fetus.

Particular care is necessary in mating the animals in such an ex-

periment, as the females are often slow to conceive and some of the  $F_2$  and  $F_3$  individuals of both sexes are not very prolific and in many cases are almost or quite sterile. Each female is kept in a separate run and the male is placed in with her just before the time of the expected heat period, ovulation, and he remains in her cage for from two to three weeks so as to be present at the second ovulation, provided the female was not made pregnant by the first mating. The ovarian cycle of the guinea-pig as worked out by L. Loeb seems to correspond closely to what is found in mating experiences.

After mating, the male is removed from the cage and the female remains alone until the young are born. These are left with the mother for about fifteen days, then separated, and the female mated again. In this way the normal females may sometimes give as many as four litters per year, but the experimental animals breed much slower and it is difficult to get even three litters per year.

#### DIRECT EFFECTS OF THE ALCOHOL TREATMENT ON THE ANIMALS.

Several of the guinea-pigs have now been treated with the fumes of alcohol almost to the point of intoxication for six days per week for a period of five years. This is a considerable space in the life of a guinea-pig, which probably would not often extend beyond six or seven years.

The animals are affected by the alcohol fumes in various ways; some of them are stupefied and become drowsy, while others become stimulated and excited and sometimes even vicious, constantly fighting and biting at the other animals in the fume tank. The fumes inhaled into the lungs pass directly into the circulation, so that the animals show signs of intoxication very soon after being put into the tank, yet the intake of alcohol is so gradual that they may remain for one hour or more without becoming totally anesthetized.

The mucosa of the respiratory tract is considerably irritated during the early stages of the treatment, but develops a resistance so that later little effect can be noticed. The cornea of the eye is greatly irritated, often becoming milky white and opaque during the first few months. In some cases this later clears and the animal is again able to see, though some of the animals treated for several years have remained entirely blind. The general condition of the animals under the fume treatment is very good. They all continue to grow if the treatment is begun before reaching their full size, and become fat and vigorous, taking plenty of food and behaving in a typically normal manner.

Some of the treated animals have died and others have been killed at different times during the progress of the experiment and their organs and tissues examined carefully and then studied microscopically. All have seemed practically normal. Tissues from sev-



eral animals treated as long as three years have been examined and the heart, stomach, lungs, kidney, and other organs present no noticeable conditions that might not be found in normal individuals. Alcoholized animals are usually fat, but there is no fatty accumulation in the parenchyma of any of the organs.

Several of the animals, both males and females, have been partially castrated during the experiments and the ovaries and testes have been found to be in a healthy condition, though certain possible changes may be present which are now being closely studied cytologically and experimentally.

The treated animals are, therefore, little changed or injured so far as their behavior and structure go. Nevertheless, the effects of the treatment are most emphatically shown by the type of offspring to which the alcoholized individuals give rise, whether they be mated together or with normal individuals. The further significance of the nature of the effects is indicated by the quality of the subsequent generations descended from such an ancestry.

#### INFLUENCE OF THE TREATMENT ON THE DESCENDANTS OF ALCOHOLIZED ANIMALS.

The records of the matings of the alcoholized animals in various pairs, the control or normal matings, and the matings of the  $F_1$  and  $F_2$  generations, the children and grandchildren of the alcoholized individuals are summarized in the general Table. This table gives a record of all the matings of the kinds indicated up to March 24th, 1916. A similar table was published two years ago, when the number of animals considered was much smaller and the actual indications from the results were less certain than now. On comparing this table with the former one, however, it will be seen that the continuation of the experiments has fully substantiated the results as previously recorded. The table now shows the records of 887 matings which produced 1,115 full-term young and 288 early abortions or negative results. These numbers are now of considerable magnitude in spite of the fact that the experiment is conducted on mammals which produce only small litters and breed slowly as compared with lower animal forms.

In the first horizontal line the record of pairing alcoholized male guinea-pigs with normal females is given. This combination could only produce defective or subnormal young as a result of the injured male germ cells, since the ova are normal and develop in a normal untreated mother. This then is the definite test of the influence of the alcohol treatment on the germ cells.

Ninety-five such matings have in 38 cases given negative results; that is, failures to conceive, or early abortions. Thus 40 per cent. of the matings of such males were non-productive, while less than 22 per cent. of normal matings under the same breeding conditions

Table

Effects of Alcohol on the Descendants of Treated Animals

March 24, 1916

Condition of the Animals	Number of Matings	Negative result or early abortion	Still-Born Litters	Number of Still-born young	Living Litters	Young dying soon after birth	Total Dead	Surviving Youngs
Alcoholic ♂ x Norm ♀	95	38 40%	10 10 1/2%	20	41	50% 1CE 4 pa	59	52 2CE
Norm ♂ x Alcoholic ♀	43	11 26%	7 16%	20	25	36% 1P	46	26
Alcoholic ♂ x Alcoholic ♀	42	20 48%	4 10%	8	18 42%	12	20	15
Summary	180	69 38%	21 12%	48	90 50%	77	125	93
Control Norm ♂ x Norm. ♀	123	26 21%	2 1.6%	8	95 77%	24	32	154
♀ Treated during Pregnancy	4	0	0	0	4	1	1	7
2 <sup>n</sup> Generation x Norm.	55	13 24%	3 5 1/2%	8 6CE	39 71%	31 2 pa	39	3CE 35
2 <sup>n</sup> Gener x Alcoholic	57	16 28%	9 16%	22 10%	32 56%	25 2DE	47	31
2 <sup>n</sup> Gener x 2 <sup>n</sup> Gener	111	34 30%	8 7%	18	69 64%	46 5CCE 4 pa	64	IDE 10CE 1CE loss
3 <sup>d</sup> Gener. x 3 <sup>d</sup> Gener.	62	23 37%	7 11%	14 1 pa	32 54%	31 2 cycles 1DE	45	23
3 <sup>d</sup> Gener x 2 <sup>n</sup> Gener.	47	17 36%	5 11%	9	25 53%	21 2 pa 4 pa	30	24
3 <sup>d</sup> Gener x Normal	26	8 31%	5 19%	9	13 50%	6	15	9
3 <sup>d</sup> Gener x Alcoholic	6	1 16%	0	0	5	4	4	6
2 <sup>n</sup> 3 <sup>d</sup> Gener x 2 <sup>n</sup> 3 <sup>d</sup> Gener.	36	12 33%	3 8%	10	21 58%	14 1 pa	24	19

887

288

551

564

failed to produce full-term litters. Ten stillborn litters, each consisting of two young, twenty stillborn young, resulted from the 95 matings. While the 123 control matings gave only two stillborn litters, and in both cases these were unusually large litters of four individuals each, and they were probably dead on account of the fact that the mother could not give normal birth to so many offspring. The stillborn litters by the alcoholized fathers were all ordinary-sized litters of two young. Thus, while about 11 per cent. of the matings of alcoholized males resulted in stillborn litters, only 1.6 per cent. stillborn litters occurred from normal matings. Forty-seven living litters were produced, thus 50 per cent. of the matings gave full-term living young, while 77 per cent. of the normal matings give living litters of young.

The 47 litters from alcoholic fathers contained in all 91 young, and 39, or almost 43 per cent., of these died soon after birth, while 95 similar litters from the control lost only 24 young, or 13 per cent., out of 178 individuals. Finally, then, from the 95 matings of alcoholic males with normal mates, only 57 full-term litters resulted, consisting in all of 111 young; 59 of these, or 53 per cent., died at birth or soon after, and only 52 individuals, or 47 per cent., survived. This was only about half as good record as the 83 per cent. surviving young from the matings of normal animals. Almost all of the offspring were very excitable, nervous animals, 4 were paralyzed, and 3 of them showed gross deformities of the eyes, while no such conditions were found among any of the offspring of normal animals bred under identical conditions.

These records leave no doubt that the alcoholized male guinea-pig is injured in such a way as to induce a decidedly bad effect upon the quality and mortality of his offspring when compared with the records from normal animals.

The second horizontal line of the table shows the results obtained when alcoholized female guinea-pigs are paired with normal males. In this case there is a double chance to injure the offspring. First through the influence of the treatment on the oocytes or the unfertilized ovarian egg, a direct effect on the germ cells comparable to the injury of the germ cells in the case of the treated males considered above. While in the second place, the developing embryo in the uterus of an alcoholized female may be directly affected by the strange substances contained in the blood and body fluids of the mother. Thus a defective individual may be produced as a result of development in an unfavorable environment or as a result of being derived from an injured or defective egg cell.

Forty-three matings of alcoholized females with normal males have in 11 cases, 28 per cent., given negative results or early abortions; this compares very favorably with the records of the control animals. Seven stillborn litters consisting of 20 in-



dividuals were produced. This is a record of 16 per cent. stillborn litters against only 1.6 per cent. from normal matings. The alcoholized females gave birth to 25 living litters containing 52 young, and 26, or 50 per cent., of these died, only 50 per cent. surviving against 86 per cent. survivals among the young of similar control litters. The records of the matings of alcoholized females compare very unfavorably with the record of the control matings. Yet the behavior of the alcoholized females is very little, if any, worse than the records shown by the alcoholized males in spite of the double chance the female has to injure her young.

The third horizontal line of the table indicates the results obtained when alcoholized males are paired with alcoholized females. Here there is every chance for the treatment to show its effect. The percentage of early abortions or negative results is very high, about 48 per cent. more than double that of the control matings. Ten per cent. of the matings produced stillborn litters, each consisting of two young. Only 18 living litters were born out of 42 matings, about 42 per cent., against 77 per cent. living litters from 123 control matings. The 18 living litters contained only 27 young, and 12 of these, or 44 per cent., died soon after birth, while but 14 per cent. of the control offspring died out of a total of 178 individuals. The data from the double alcoholic matings are, therefore, extremely bad in the light of normal matings from the same animal stocks bred under exactly the same cage and food conditions.

The fourth horizontal line summarizes the records of all the matings of directly alcoholized animals. In all, 180 such matings have been made, 69 of these, or about 38 per cent., gave negative results or early abortions. Twenty-one stillborn litters occurred, consisting of 48 individuals against only two questionable stillborn litters from 123 control matings. Ninety, or only 50 per cent., living litters were born, consisting of 170 individuals, 93, or 54 per cent., of which survived and 77, or 46 per cent., died soon after birth; in all 125 full-term young died, while only 93, or 42 per cent., of the total 218 full-term young resulting from the 180 alcoholic matings survived. On the other hand, out of a total of 186 full-term young from only 123 control matings, 154, or 82 per cent., survived. The control matings were far more prolific than those of the alcoholized animals and the condition of the young as indicated by the mortality record was far superior to that of the alcoholic offspring.

The fifth line records the outcome of 123 control matings which have been scattered through the entire progress of the experiment under exactly the same conditions and from the same animal stocks as the experimental matings. Eighty-six per cent. of the young in the 95 living litters resulting from the matings of normal animals have survived and all are strong, healthy individuals; in not one instance do they show an indication of nervous degeneracy or any



FIG. 1.—521 albino  $F_2$  ♀ (two alcoholic grandmothers, both grandfathers normal). Lived only one day after birth; the meninges of the brain were filled with blood. Gross tremor and complete paralysis of right side. Cataracts, both crystalline lenses being entirely opaque. The photograph shows the outstretched paralyzed right extremities while the left legs are held in a normal position in their effort to support the body. (Birth weight, 54 grm.)



FIG. 2.—506 mouse and yellow  $F_{2,3}$  ♂ (two paternal great-grandmothers and the maternal grandmother alcoholic, slightly inbred). Gross tremor and complete paralysis of left side, so unable to walk. Cornea of right eye opaque. Photograph shows the powerless condition of the outstretched left legs with the right legs attempting to support the body. (Birth weight, 57 grm.) The two figures are at different magnifications.

type of recognizable structural deformity, while such degeneracy as well as deformities are extremely prevalent among the offspring and descendants of the alcoholized animals. One other point to be mentioned in considering the records of the control matings is the fact that from 123 matings only two stillborn litters were produced and, as mentioned above, both of these litters were of so large a size that the mothers seemed unable successfully to deliver them and one of the mothers failed to recover from the process and died a few days later. These 2 cases make the control records appear worse than they actually should, but in spite of this the control matings have given data equally as good as those generally obtained by careful breeding experiments with vigorous normal stocks. The stock in these experiments is unquestionably good, as the control matings very readily show.

Four normal females were mated and then treated with alcohol throughout their periods of pregnancy and, as the sixth horizontal line of the table indicates, such a treatment was not at all injurious in these particular cases. It actually happened that some of these young were unusually vigorous. The numbers are very small, but this is a direct test, and if such a treatment were really decidedly effective in its action on the embryo or fetus *in utero* these eight young animals should have at least shown some response. It is very possible that after the treatment has been continued for a long time, a year or more, that the mother then presents a uterine environment unfavorable for normal development, since the offspring of such individuals are almost always subnormal. In these cases, however, the inferior quality of the offspring may be due to the action of the alcoholic treatment on the ovarian germ cells rather than the direct environmental effect on the developing embryo or fetus, since there is no way at such a stage to separate the two possible effects.

The next three horizontal lines, seventh, eighth and ninth, give the data resulting from the matings in various combinations of the  $F_1$  animals, that is, offspring from alcoholic parentage, but which are not themselves treated with alcohol. The records of these non-treated  $F_1$  individuals are most instructive for an understanding of the actual influences of the alcoholic treatments.

When such  $F_1$  animals are paired with normal individuals the seventh line shows that 24 per cent. of the matings failed, which is not a bad record. The proportion of stillborn litters, however, from the  $F_1$  by normal combination was three times as great as from normal matings, and 75 per cent. of the stillborn young produced showed gross defects of the eyes, having opaque lenses or typical cataract conditions, while not one of 186 young from normal matings has shown this or any other noticeably abnormal structure. Thirty-nine living litters were produced containing in all 66 in-





FIG. 3.—701 agouti, yellow and white, normal  $F_3$  ♂. A normal animal from the fourth generation of the control; slightly inbred, natural size. (Birth weight, 63 grm.)



FIG. 4.—599 black, white and red.  $F_3$  ♂. A degenerate animal from the fourth generation alcoholic lines; no inbreeding; the paternal grandmother had both parents alcoholic and the maternal grandfather had both parents alcoholic. So there were two alcoholic great-grandmothers and two alcoholic great-grandfathers; the other four great-grandparents were normal and one grandmother and one grandfather had no alcoholism in their ancestry. The parents were ♂ (NN) (AA) ♀ (AA) (NN). The animal lived seven days and died in convulsions. The photograph shows the front limbs bent under the body and the animal is unable to raise the head. It weighed only 35 grm. at the time of death, having lost 7 grm. While the above normal animal weighed 63 grm., actually a little small, at birth and all normal animals increase in weight rapidly from that time.

dividuals, 31, or 47 per cent., of which died soon after birth, while 35 survived. Two of those dying soon after birth were paralyzed and unable to walk, while three of the 35 survivors have defective opaque eyes, and many show different nervous symptoms. Thus of 74 full-term young produced by  $F_1$  animals with normal mates, only 35, or 47 per cent., survived for more than a short time after birth, and 8 per cent. of these have gross defects and more than half of them are nervous, excitable individuals, which when mated with normal animals or in any other combination always give very poor quality offspring, if any at all.

The eighth line shows the records of 57 matings between  $F_1$  animals and alcoholics. This combination again gives data comparing most unfavorably with the control and in some ways even worse than the records of matings between two alcoholic animals. Sixteen per cent. of such matings produced stillborn litters! Almost half of the young in the living litters died and here again some were deformed. Deformities are strikingly more abundant among the offspring from  $F_1$  and  $F_2$  parents than from the directly alcoholized animals.

The record of 111 *inter se* matings of  $F_1$  animals is shown in the ninth line. Thirty per cent. of such matings gave negative results or early abortions, over 7 per cent. stillborn litters and 62 per cent. living litters. Little less than half of the living young died soon after birth, in all 46, nine of which, or about one in five, 20 per cent., were paralyzed or deformed. Seventy of the offspring survived, five with deformed eyes, one with one eyeball completely absent, monster monophthalmicum asymmetricum, and almost all of the 70 are very nervous, excitable animals which when bred give rise to deformed or highly degenerate offspring.

The offspring from the  $F_1$  animals mated in any combination are generally far below the normal in power to survive and in quality of structure. When compared with the offspring from directly alcoholized parents, the offspring from the  $F_1$  combinations show an equally bad mortality record and a very much higher proportion of paralyzed and deformed individuals. The 111 matings *inter se* of  $F_1$  animals demonstrate conclusively that such individuals carry defective or abnormal germ cells which give rise to defective developmental products. These degenerate  $F_2$  offspring owe their subnormal condition to the effects of the action of the alcohol treatment upon the germ cells of their grandparents which have been transmitted to them through their parents. In other words, the carriers of hereditary qualities have been modified in the first parental generation, and the effects of this modification are expressed in their offspring  $F_1$ , and also in their grandchildren, the  $F_2$  generation.

The next line of the table, the tenth, indicates further how the

effects of the original modification are transmitted to the great grandchildren or through three generations since the injury. Sixty-two *inter se* matings of  $F_2$  animals gave the results here shown. Almost 37 per cent. of the matings gave negative results or early abortions. About 11 per cent. of such matings gave stillborn litters, 7 in 62 matings, which is remarkably high when compared with any of the above combinations.

Thirty-two living litters were produced, containing in all 54 young; 31 of these, almost 60 per cent., died soon after birth, and only 23 survived. Six of the 31 that died were paralyzed and unable to stand, while 8 of them, a strikingly high proportion, were grossly deformed. Six had one or both eyes deformed and two were anophthalmic monsters, being completely without eyeballs, optic nerves, optic chiasma or any gross signs of optic tracts.

Sixty-eight full-term young were produced by the  $F_2$  matings, but only 23 of these, or just 34 per cent., were able to survive, while about two and one-half times this proportion, or 82 per cent. of the full-term young from control matings, survived as vigorous, healthy individuals. The 23 living  $F_3$  animals are all rather weak and degenerate and almost completely sterile according to a considerable number of careful matings with strong, fertile guinea-pigs. The alcoholic race seems at this stage of the experiment about to fade out in the fourth generation, while normal control lines from the same original stocks have passed far beyond this generation, continuing to breed normally and showing no signs of degeneracy, and never in any case giving rise to a grossly deformed animal.

The eleventh line of the table indicates again the very decided effects transmitted by the descendants of animals which had suffered a modification of their germ plasm by the alcoholization of their tissues.

When  $F_2$  animals are mated with normal individuals the results are very little if any improved over the two above combinations. In this experiment, although one mate was a normal animal, the  $F_2$  mate carried germ cells of so inferior a quality that the output of the combination, admitting the numbers are small, leaves no doubt of the transmission, *through three generations*, of defective conditions induced by alcoholizing the great grandparents of the offspring on only one side of the family, or in only one of the parental lines.

The last line of the table gives the records of mixed combinations of  $F_1$  and  $F_2$  individuals, and here the data are closely similar to those obtained from other combinations of these animals; only about 44 per cent. of the full-term young born are capable of surviving, while 82 per cent. of the control young are living.

Briefly then, a careful study of all these young animals extend-



ing over a period of more than five years has afforded data which convincingly show that the treatment of either the male or the female guinea-pig with fumes of alcohol affects the quality of the offspring to which these animals give rise even when paired with normal mates. And further, the changed quality of the offspring is subsequently transmitted through succeeding generations with even more severe marks of degeneration and deformity than those exhibited by the offspring of the directly treated animals.



FIG. 5.—955 albino  $F_3$  ♀ and 957 black and red  $F_3$  ♂. Born in same litter, from a normal father and a mother descended from four alcoholic grandparents. The female 955 is a strong animal weighing 90 gm. at birth, taking the characters of the normal father that was also an albino. The male 957 is small, birth weight 38 gm., and degenerate with paralysis agitans and lived only three days, inheriting his degeneracy and color from the black and red mother of alcoholic ancestry.

Other combinations and back crosses are now in progress which are fully in line with the above, but which have not yet afforded sufficient analytical data to record.

The defects caused by the alcohol treatment seem to be largely confined to the central nervous system and organs of special sense. Paralysis agitans is very common among the  $F_1$ ,  $F_2$  and  $F_3$  animals. Paralyzed limbs are often observed, the animals being unable to stand or walk (Figs. 1, 2 and 4). The eye is also a peculiarly sensitive indicator and presents in the various descendants of alcoholized individuals all degrees of degeneration—opaque cornea, cataract or

opaque lenses, small defective eyes, complete absence of one eye, and finally complete absence of both eyeballs—anophthalmic monsters. In the latter case the extrinsic eye muscles, the third, fourth and sixth nerves, the lachrymal glands and other structures of the orbit are present, though the eyeball is completely wanting.

Not only are the above congenital eye defects present, but in several instances members of the alcoholic lines have become blind during the first year or year and a half after birth, whereas in our control this has never occurred.

It is peculiarly interesting to find these particular eye conditions exhibited by the descendants of alcoholized animals, since as I (1910) have previously shown, closely similar eye conditions are obtained in great numbers by directly treating the eggs of fish with solutions of alcohol; and like conditions were also obtained, though not so consistently, by treating hens' eggs (1914) with alcohol fumes either before or during incubation.

#### SUMMARY OF RESULTS.

In spite of their healthy appearance the injurious influence of the alcohol inhalation is very decidedly shown by the quality of offspring to which the treated guinea-pigs give rise. And the descendants of these offspring are even worse than the  $F_1$  generation when compared with the different generations of control animals produced under identical cage and food conditions.

The males seem to be more injured by the treatment than the females, taking as an index of injury the quality of their offspring and descendants. Stating it differently, the spermatocytes or spermatozoa are more sensitive to the changed chemical condition of the tissues than are the female germ cells.

There is a larger proportion of degenerate, paralytic and grossly deformed individuals descended from the alcoholized males than from the alcoholized females.

The records of 1,115 offspring produced by 887 matings of animals of various types are presented in the accompanying table to show the kinds of litters of young produced and their ability to survive. One hundred and eighty matings of alcoholized animals, in which either the father, mother, or both were alcoholic, gave 69, or almost 40 per cent., negative results or early abortions, while only 21 per cent. of the control matings failed to give full-term litters. Of the 111 full-term litters from alcoholic parents 12 per cent. contained stillborn young, and only 50 per cent. of all the matings resulted in living litters. Forty-five per cent. of the individuals in the litters of living young died very soon after birth. In contrast to this record, 77 per cent. of the 123 control matings gave living litters and 86 per cent. of the young in these litters survived as normal, healthy animals.

The mating records of the descendants of the alcoholized guinea-pigs, although they themselves were not treated with alcohol, compare in some respects even more unfavorably with the control records than do the above data from the directly alcoholized animals.

Of 223 matings of  $F_1$  animals in various combinations 63 have resulted in negative results or early abortions, 20 stillborn litters of 48 young occurred, and 14 per cent. of these stillborn young were deformed. One hundred and forty living litters contained 238 young, but 102 of these died within a few days and almost 13 per cent. of them were deformed, while 136 survived and 8 of these showed eye deformities. Among 186 full-term control young of the same stock not one has been deformed.

The table shows that the records of the matings of  $F_2$  animals, third generation, are still worse, higher mortality and more pronounced deformities, while the few  $F_3$  individuals which have survived are generally weak and in many instances appear to be quite sterile even though paired with vigorous, prolific, normal mates.

The structural defects shown by the descendants of alcoholized animals seem to be confined chiefly to the central nervous system and special sense organs. Many of the young animals show gross tremors, paralysis agitans; the hind legs, fore legs or both legs of one side may be paralyzed (Figs. 1, 2 and 4). Eye defects are very common, such as opaque cornea, opaque lens, various degrees of monophthalmicum asymmetricum, and finally, several cases of complete anophthalmia have occurred, the entire eyeballs, optic nerves and optic chiasma being absent.

The quality of individuals from the same parentage varies inversely with the size of the litters in which they are produced. Animals born one in a litter are rather strong, even though derived from very bad alcoholic lines. This difference between the members of small and large litters is also shown by the normal animals, but the difference in quality between members of large and small litters is ever so much greater in the alcoholic lines. There is also some tendency on the part of the alcoholic animals to produce a greater proportion of small litters and this aids somewhat towards the perpetuation of their lines.

Inbreeding tends to emphasize the alcoholic effects. This is probably due to related animals responding to the treatment in closely similar ways on account of the similarity of their constitutions. Inbreeding, as such, may be harmful. But inbreeding added to the alcohol effects produces a much worse condition in the offspring than either inbreeding or alcoholism alone could do.

The data from alcoholized male lines indicate that the *female offspring from alcoholic males are less viable and more frequently deformed than the male offspring. And heterogeneous matings of*



*such male and female offspring further emphasize the same inferiority on the part of the female offspring from treated males. This is a very significant fact.*

The fact that the offspring of one sex differ in quality from those of the opposite sex, and that the female offspring of an alcoholic male are inferior to his male offspring suggests at once a difference between the germ cells concerned in the production of the male and female young. Miss Stevens showed that the spermatocytes of the male guinea-pig contained a heteromorphic pair of chromosomes and half of the spermatozoa would be expected to receive one member, the X chromosome, of the heteromorphic pair and one-half of the spermatozoa the other member, the Y chromosome, of the heteromorphic pair. We now have two possibilities in explanation of the above facts. In the first place, it may be assumed that the alcohol acts similarly on all of the chromatin to injure it. Thus a mass action would cause the spermatozoa carrying the larger member of the heteromorphic pair to deliver more injured chromatin and the other spermatozoa with a less total amount of injured chromatin would deliver less when they fertilize eggs containing equal amounts of normal chromatin. The fertilized egg giving rise to the female, therefore, contains a greater proportional amount of alcoholic chromatin to normal chromatin than does the egg giving rise to the male. And so the female product is actually more injured than the male.

A second possible explanation of these conditions may be that the X and Y chromosomes themselves respond differently to the treatment, the X being the more sensitive of the two. But in either case the two classes of spermatozoa certainly seem to respond differently to the treatment and this shows a physiological difference in behavior to correspond with the well-known morphological differences so often found between the two groups of spermatids of many animal species.

The data from alcoholic female lines indicate that *the male offspring from alcoholic females are inferior in quality to the female offspring. And heterogeneous matings of such male and female offspring further prove the inferiority on the part of the male offspring from treated mothers.* This is also significant. How can it be put in accord with the above chromosomal explanations for the difference in quality between the female and male young of alcoholized fathers?

If we admit that all of the eggs arising from an alcoholized female guinea-pig are homomorphic and contain groups of chromosomes equal in mass, it follows that her male and female offspring receive the same amount of injured chromatin and should be affected by such chromatin to equal degrees. But this is only part of the case; the injured female chromatin is combined with normal

chromatin from the normal father when the eggs are fertilized and here the difference arises. The female offspring receive from the normal father a larger amount of normal chromatin than do the male offspring. So that the female arises from an egg in which equal amounts of good and injured chromatin are present, while the male offspring arises from an egg in which a larger amount of injured chromatin is united with a smaller amount of normal. Therefore, proportionately, the male offspring from treated mothers have more injured chromatin in their entire bodily make-up than do the female offspring, and are comparatively in a more abnormal condition. This reasoning refers only to the immediate offspring of alcoholic parents and not to their later descendants.

Another explanation of these differences between the male and female offspring of alcoholized females could be based on the possibility of the female being heterozygous for sex. This involves a very complex discussion, but one for which there is some ground on the basis of the regulation of the sex ratio in these animals.

Finally, then, the experiments show the hereditary transmission through several generations of conditions resulting from an artificially induced change in the germ cells of one generation by treatment with alcohol. And they furnish data of importance bearing upon the pathological behavior of the carriers of heredity as well as the differences in behavior between the two types of germ cells produced by an animal carrying heteromorphic chromosomes.

It is impossible in an article of this length to give much of the important detail of the experiments, such as the records of successive pregnancies of normal females by normal and alcoholic mates and many other individual responses which are necessary for a full understanding of the conditions and results. Should the reader be further interested in the biological aspects of this problem he may refer to the publications cited below in which the author has recorded in a more detailed manner experimental studies conducted for the past seven years in analyzing the effects of alcohol on the development of various classes of vertebrates.

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## ALCOHOLISM, A SYMPTOM.\*

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There are two conceptions connected with the use of alcohol, one of which has been seriously invaded on the scientific side and its position weakened, but the other of which still holds sway. The first of these is the conception that alcohol is a stimulant. I need hardly, in speaking to a body like this, tell how thoroughly the props have been knocked out from under this position. In the destruction of this, I might almost call it superstition, the work of Kræpelin stands out prominently. The other is the idea that alcohol is a habit-forming drug. This means, I take it, that it has some special power for creating a habit on the part of the individual and, that power is greater for some reason, not specified, than the habit-creating power of milk, beef steak, or other nutrient taken into the gastro-intestinal tract. This second conception is still strong in the minds of people at large, and I think occupies a place in a great deal of the thinking of professional men about alcoholism. It is, however, in my opinion, as faulty a belief as the belief in its stimulating properties; both beliefs are founded upon the same cause, the knowledge of which serves to explain them.

It is unnecessary to enter further into the details of the experimental work, which has demonstrated that alcohol is not a stimulant, than to say, that in a very general way the practical results of that work are that accurate observations of both muscular and mental work under the influence of alcohol show a progressively falling curve of efficiency.\*\*

As to the matter of the habit-forming properties of alcohol, I am not aware that any experimental work has been instituted to demonstrate their existence or lack of existence. I may, however, call your attention to a series of mental conditions in which alcohol rather characteristically enters, at least in certain individual cases. Alcohol quite characteristically enters into the picture, not only in

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\*Read before the Society for the Study of Inebriety at Washington, December, 1915.

\*\*See especially the work of Rivers and Webber: *The Influence of Small Doses of Alcohol on the Capacity for Muscular Work.* (*British Jour. Psychol.*, January, 1908.) Dodge and Benedict: *Neuromuscular Effects of Moderate Doses of Alcohol.* (*Proc. Nat. Acad. Sc.*, 1915, Vol. I, p. 605.) *Psychological Effects of Alcohol. An Experimental Investigation of the Effects of Moderate Doses of Ethyl Alcohol on a Related Group of Neuromuscular Processes in Man.* (Published from the Nutrition Laboratory of the Carnegie Institution of Washington, Washington, D. C.)



alcoholic psychoses properly so-called, but in the manic-depressive psychoses, the dementia præcox group of psychoses, and of course in the early stages, particularly, of paresis. It is to the manic-depressive psychosis that I would at this point particularly call your attention. This psychosis, as you know, consists, to put it briefly, in alternating periods of depression and exaltation, interrupted or followed by a normal interval of variable length. Occasionally, a patient suffering from this psychosis shows the initial symptoms of his excitement by over-indulgence in alcohol, and it is sometimes exceedingly difficult to differentiate the condition from one purely the result of alcoholic indulgence. In fact, this can sometimes only be done satisfactorily when the patient is interned and the alcohol withdrawn. Continuance of the excitement shows the nature of the situation. Now this periodic type of psychosis with its periodic indulgence in alcohol, should be an object lesson to us in the matter of the so-called habit-producing qualities of this drug. The individual, who has become alcoholic contemporaneously with his attack of excitement, ceases his indulgence when he again becomes normal and has no tendency to drink again until the excitement recurs. Such evidence seems to me to be very strongly suggestive of the erroneousness of the conception of alcohol as a habit-producing drug.

Aside from the conditions above mentioned, in which a psychosis is manifestly at the bottom of the alcoholic indulgence, and aside from other conditions, such as severe physical pain from chronic illness, and other manifest factors, which might be considered sufficiently explanatory of the alcoholism, there is a group of cases which we know, but which we would have difficulty, perhaps, in defining, which might be spoken of as the 'classical type' in which none of these etiological factors is present, and yet in which the individual seems to be hopelessly enslaved by the drug.

Is alcohol in these cases only a symptom of some underlying fundamental condition which has escaped our notice, simply because it is too subtle to be seen by casual observation or found by ordinary methods of inquiry? I think it is, and my attention was first attracted to this possibility many years ago. Some of you, at least, will remember the work of J. B. Haycraft,\* in which the author undertook a statistical study of the effects produced by prohibition, in several of our prohibition states, where prohibition statutes had been in operation for a considerable number of years. His conclusions were no less striking than unexpected at that time. It was to the effect that the statistics clearly indicated in these states, that as the consumption of alcohol had been diminished and as drunkenness had been lessened, the admissions to the insane asylums and poor houses had progressively and correspondingly in-

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\*Darwinism and Race Progress. London, 1895.

creased. If we do not instantly discard such a conclusion as this, and will stop for a moment and give it careful consideration, we must be struck by the probability of its truth, and by its important social significance. Such a conclusion can only mean that the alcoholic as such is a mental defective in some way, and that if his mental deficiency does not show as indulgence in alcohol, it will later show as frank mental disease, or as that type of deficiency which leads to pauperism.

This conclusion, I am convinced is a correct one, and I am reminded as I dictate these words of the occasion of a meeting of your Society here at Washington some two or three years ago in which I heard your President, a man grown old in this particular work, say in discussion that he had never seen an inebriate, who, aside from his inebriety, was a normal man. Can this underlying defect which your President referred to, and which I think most of us will be prepared to admit exists, be any more clearly defined than in this nebulous way? It seems to me that one of the greatest services that could be done, in the matter of the study of inebriety, would be the careful characterological study of the different types of inebriates. I am not aware that this has been done, or at least adequately done, but in the absence of such accurate studies, in accordance with our later psychological conceptions, we still have a vast amount of material and experience in other lines to draw from, which by analogy may suggest the underlying character traits of the inebriate.

The necessary limitations of such a paper as this make it impossible for me to go into a lengthy psychological discussion. I will, therefore, say what I have to say, more or less dogmatically to the end of brevity.

Inebriety, in my opinion, must be considered as a neurosis, and from this point of view has the two fundamental traits of a neurosis which are of prime importance in explaining its symptoms. In the first instance, the prevailing and all pervading feeling of the neurotic is one of inefficiency, and I think that you will admit with me, that the life history of the alcoholic shows him to be an inefficient individual. He is incapable of meeting reality efficiently every day. He may be able to deal with the problem of reality for a greater or lesser length of time, but continuity of effort, day in and day out, is foreign to the alcoholic character. He can stand the strain only about so long, longer in some cases than in others, but the principle is the same. This is the inefficiency Adler believes is dependent upon organic inferiority (*Minderwertigkeit der Organe*), or to use an older and more tried term, it is constitutional.

Now, assuming this condition of inefficiency, based upon constitutional organic defect, in the make-up of the individual, how does such a person react to such a deficiency of make-up? The re-

action is an effort at finding safety,—it is the *Sicherungstendenz* of Adler, the flight to cover, so to speak, which drives the inefficient individual to find some way of escape from the horrid facts, the overburdening oppressions of reality.

This path he finds open to him through the use of alcohol. How frequently do we see the alcoholic, not going out into the public dining-room and meeting with his fellows, not mixing with the world, but retiring by himself, shutting himself up in his room, perhaps in darkness, in solitude, and in quiet, and drinking himself stupid, unconscious! Here the escape is absolutely necessary, there is no compromise possible; reality must be driven out at any cost, even to the point of unconsciousness.

We have of course many lesser degrees of escape than this. We have the jovial, story-telling, tipsy inebriate, who escapes from all responsibility, who sits up all night and slaps his friends on the back, and laughs and jokes, and gives the morrow notice that he cares not what it brings forth, that to-night is to-night, and let the morrow take care of itself. We know the type, but does not the same explanation hold as in the former case? Is not this man also escaping from reality by not meeting it efficiently, not only by so crippling himself that on the morrow he is unable to face it, but by his very words he abjures it?

The feeling of inefficiency and flight from reality, the ear-marks of a neurosis, are the ear-marks of alcoholism and now we can understand why alcohol has been called a stimulant, and why it has been called a habit-producing drug. It has been called a stimulant, because the individual, who is incapable of facing reality and has had to take alcohol to escape, has had also to have the best possible reason for taking it—namely, that it would help him to meet reality. It is a pure fiction of the alcoholic, this stimulating quality of alcohol. As to the habit-producing qualities of this drug—another fiction—the alcoholic cannot get along without his alcohol; he must find a road that takes him away from reality, once in a while at least; therefore the fiction of the habit. The alcohol has gripped him with this mysterious habit; like an evil spirit he is in its clutches, and therefore he, himself, to himself is no longer responsible. He has projected his responsibility upon this myth, and therefore calmed his conscience.

When we understand better the fundamental conditions which underlie the symptom, alcoholism, we may be able to do something more definitely constructive about it.



## THE DIAGNOSIS OF DELIRIUM TREMENS.

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Clinical analysis and post-mortem control have shown that the diagnosis of delirium tremens is not always an easy one; and they have demonstrated, furthermore, that the error is more frequently one of commission than of omission.

Our object in writing the following pages is twofold. We shall endeavor, in the first place, to point out in some detail, the etiological, pathological and clinical features which a large experience has taught us to regard as especially significant in the diagnosis of this condition, and, secondly, to emphasize the conditions which autopsy reveals are most frequently confused with delirium tremens.

Our conclusions are based for the most part upon the observation of clinical material in the House of Correction and Scelesh Hospitals, Chicago; and, inasmuch as practically all of the cases with a lethal outcome are subjected to a post-mortem examination, we find ourselves in a particularly advantageous position to check our bedside findings with the anatomical diagnoses.

*Etiological Factors Significant in the Diagnosis.*—The immediate cause of delirium tremens is not known. Certain observers<sup>1</sup> have emphasized the importance of an autointoxication in this connection. According to this theory, chronic alcoholism renders the gastro-intestinal tract and liver incapable of destroying the metabolic toxins brought to them—and which normally they are able to make harmless—with the result that the poisons accumulate and at a given moment overwhelm the individual.

The theory of Wagner von Jauregg<sup>2</sup> assumes that alcohol when ingested provokes the formation both of a toxin and of an antitoxin. So long as alcohol is indulged in, the latter serves to neutralize the former; but when the drug is withdrawn, antitoxin is no longer formed, and the unexcreted toxin can act unhindered. This conception has little in its favor, however, as quite as many of our patients develop delirium after a prolonged spree as after a sudden withdrawal of the alcohol. More in accordance with the facts is the view that the delirium is an acidosis due to prolonged starvation, for it is well known that the alcoholic can take

practically no food while he is drinking, and further that the taking of nourishment goes hand in hand with improvement.

Though the pathogenesis of delirium tremens is still obscure, a number of predisposing factors are of unquestioned significance. Thus a more or less fixed incubation period is observed, which in our experience is rarely under seven, and varies from seven to fifteen years. Those exceptional cases which develop prematurely must be regarded as examples of an unusual susceptibility to the poison. One attack, furthermore, predisposes to subsequent ones. Again, the great majority of cases arise in those accustomed to the use of distilled liquors, wines and beers being much less harmful in this respect, though individual susceptibility also plays a rôle here. Our personal experience shows no case in which beer alone had been used. In our series, the bulk of the cases fall between the ages of twenty-five and forty. As to sex, the male is much the more frequently affected; while as to race, the negro is almost totally immune.

Certain well-defined causes usually bring on the attack. In some cases a prolonged spree, in others a long-continued period of abstinence are responsible. Particularly suggestive of the alcoholic as against other forms of delirium is the frequent association of the former with a fracture or other trauma, and with certain infections such as pneumonia and erysipelas. The exact relation of starvation to delirium tremens—a period of three weeks during which no food other than the alcohol has been taken seems to represent the average abstinence—is still unsettled. Mention has already been made of the theory that a starvation acidosis is the vital factor in the condition; be this as it may, the failure to take proper food is, if not the underlying cause, at least a very important element in predisposing to the onset of alcoholic delirium.

An analysis of the above-mentioned etiological factors, in those favorable cases in which an anamnesis is obtainable, will often be of incalculable service in arriving at a diagnosis of a case in which the clinical picture is obscure or atypical.

*Post-Mortem Findings Bearing Upon the Diagnosis.*—Pathologists are not agreed that there is a constant autopsy picture characteristic of delirium tremens. The greater number of the changes found in those who have succumbed to mania a potu are undoubtedly those of chronic alcoholism, added to which may be the more immediate cause of death—pneumonia, erysipelas, trauma, tuberculosis, etc. Though the anatomical changes characteristic of chronic alcoholism as a rule suffice to diagnose the latter at autopsy, they cannot be accepted as convincing evidence that death was due to delirium tremens, for it is obvious that the alcoholism may have been merely an associated condition.

There have been described, however, several changes which seem

to be more or less intimately related to the delirious phase of the alcoholism. Among these is a high degree of cerebral edema, the details of which are noted in an earlier contribution by us.<sup>3</sup> That delirium tremens stands prominent among those conditions causing a marked cerebral edema, or 'wet brain,' has recently been emphasized by Nuzum and LeCount.<sup>4</sup>

Hirsch,<sup>5</sup> on the basis of material coming chiefly from our wards, has called attention to another change which he has observed with regularity in delirium cases—namely, a narrowing of the yellow rim of the suprarenal glands. This narrowing, which is due to a diminution of the cholesterol content of the glands, may be of variable degree even to a complete disappearance of the yellow rim.

The question of diffuse cerebral, and, to a lesser extent, spinal hemorrhages, from pinpoint to pea-sized and larger, remains unsettled in that it is still undetermined whether they belong to the anatomical picture of chronic alcoholism or are pathognomic of delirium tremens, being responsible perhaps for the nervous symptoms of the latter. Wassermeyer,<sup>6</sup> among others, is inclined to regard them as of special importance in the etiology of the delirious picture. These hemorrhages are found chiefly in the cerebrum, in the cerebellum to some extent, and less frequently in the cord, their site of election being in the central and frontal convolutions in the cerebral cortex, and more especially in the gray matter about the third and fourth ventricles, in the lamina quadrigemina and in the Sylvian aqueduct; while it is not uncommon to see them in the region of the nuclei of the third and sixth cranial nerves.

*Diagnostic Symptoms.*—The onset of delirium tremens may be gradual or abrupt. In the former case, the patient exhibits toward evening a more or less definite prodromal picture consisting of a vague uneasiness, a tendency to start at slight noises, ill-formed hallucinations of sight and hearing, insomnia, disturbed dreams, paresthesias, a tremor of the hand and tongue, and a constant fear that some evil will overtake him. These prodromata, constituting the so-called touch of the horrors, may last from two to ten days, at the end of which time the picture either becomes fully developed or recovery occurs.

The symptoms of delirium tremens proper may be divided into the somatic, or physical, and the mental. In the following paragraphs we shall limit ourselves to a discussion of only the salient manifestations coming under these two heads.

(a) *Somatic Features.*—The patient usually shows a well-marked conjunctivitis and pharyngitis and a flushed face. Perhaps no phase of the condition is more pronounced than the great *motor unrest*, evidenced among other things by the pulling at the bed-clothes, the tugging at the restraining bands, the grimacing, the laughing and the constant talking. It must be emphasized, how-



ever, that the patient never laughs boisterously and rarely assaults other patients.

Closely related to this motor excitement is the *tremor* from which the condition derives its name. The tremor, which is distinctively coarse, may involve only the muscles of the hands and tongue, or in severe cases it may be practically universal, leaving only the muscles of the eyes, and possibly the head, free. The effects of the tremor are seen in the tottering gait, in the inability to grasp and to hold objects, in the stumbling and inaccurate speech, and in the jerky handwriting.

*Sweating* is another prominent symptom and is brought on by the slightest exertion. *Insomnia* is one of the most harassing features and continues throughout the course of the delirium. An elevation of the *temperature* is almost the rule. In the majority of uncomplicated cases the type is subfebrile, *i. e.*, not exceeding 102°. In a certain proportion, however, high temperatures are observed. Mangan<sup>7</sup> has called attention to this type, calling it *delirium tremens febrile*. Nevertheless, it is only by a process of careful exclusion that such a diagnosis can be made, as the bulk of the cases with a high temperature are undoubtedly complicated by other conditions, such as pneumonia, tuberculosis and sepsis. The *pulse* is generally rapid and small, and is often irregular because of the associated myocardial degeneration.

Certain *laboratory findings* are also valuable in the diagnosis. In about three-fourths of the cases the urine contains albumin, and in a much smaller percentage, sugar. In uncomplicated cases, the albumin disappears as the delirium subsides. A moderate leucocytosis is observed as a rule even in the uncomplicated cases, the polynuclear neutrophilic forms predominating. We have already emphasized the fact that the cerebrospinal fluid is not under an increased pressure.<sup>3</sup> Cytoanalysis shows no variations from the normal, and the various globulin reactions are negative.

The behavior of the pupils in delirium tremens is particularly interesting. In the great majority of cases they are small, equal, regular and respond sluggishly to light. Certain observers, however, among whom are Nonne<sup>8</sup> and Uhthoff,<sup>9</sup> have described cases of chronic alcoholism with a complete loss of the response to light and preservation of that to accommodation, *i. e.*, an Argyll-Robertson pupil, with no demonstrable evidences of syphilis; and we have observed a similar case. Too great an importance cannot be attached to those reports which appeared before the discovery of the Wassermann reaction, particularly in its application to the spinal fluid, and of the cytological and chemical attributes of the fluid which we now know to be diagnostic of nervous lesions of luetic origin even in their earliest manifestations.

The *reflexes* are generally brisk and show no deviations from the normal in the uncomplicated case.

(b) *Psychic Features*.—The dominant mental features are the clouding of consciousness, the complete disorientation and the delusions and hallucinations.

Some *disturbance of consciousness* is always present, though the degree varies. Insensibility is most marked in the severe cases, especially in the 'wet-brain,' or comatose type, and in those forms ushered in, or accompanied by, epileptiform attacks. Except in the undeveloped and very light forms, there is regularly a pronounced *disorientation* which applies both to place and to time. The patient is quite unable to name his surroundings, has no idea of the day or month, and greets strangers as old friends. In striking contrast with this, however, is his complete retention of minute data regarding his own personality. He speaks with accuracy of his family, of his work and of events in his life.

The delusions are a particularly characteristic part of the picture; and sense deceptions are among the first to appear. Illusions and hallucinations of all the senses occur, but those of sight and hearing dominate. They are perceived first at night and with great clearness. Early they may be recognized by the patient as unreal, but later, as the condition progresses and consciousness becomes clouded, they are real to him and a source of the most profound emotional distress.

This phase of the picture is so familiar a one that we shall not enter into it in detail. Most marked are the hallucinations of sight. Any of the members of the animal world, from the tiniest to the largest, usual and fantastic, may appear, always in multiple form, to harass the patient. Though the content of the sense deceptions are generally terrifying, they may be pleasurable, or, at other times, mixed. Auditory delusions are also frequent and are likewise usually fear-producing. With the recent application of hydrotherapeutic measures, fishes, frogs and other inhabitants of the water often form the content of the hallucinations. Finally, of importance in the diagnosis is the fact that the various delusions commonly are joined by the individual into an occupation delirium, which may or may not be based upon the particular occupation of the patient.

The *intense anxiety* of the majority of delirious individuals is another highly characteristic feature. This is referable to the predominance of fear-producing illusions and hallucinations. Others are decidedly cheerful and optimistic, or anxiety and euphoria may alternate. Occasionally a patient is seen in whom fear and good nature are mingled, giving the observer the impression that the individual appreciates the absurdity of his experiences.

Though the patient, as already emphasized, is in a constant ferment of activity, it is important to note in describing his emotional attitude, that he never cries or sheds tears. Moaning is always suggestive of meningitis. Nor does the delirious patient complain of feeling ill; when asked how he feels, he usually replies, Fine! To injury to himself, finally, he is more or less indifferent.

Characteristic, furthermore, of the delusions of delirium tremens is that they are very readily influenced by suggestion. A word may start an entirely new train of illusions and hallucinations; pressure upon the eyeball may bring about a complete change in the visual delusions; while showing the patient a blank piece of paper will frequently under the influence of suggestion cause him to read a discourse upon the subject suggested.

There is a marked disturbance, further, in the patient's *power to concentrate*. His attention may be held for a moment, it is true, especially if forcible language be employed; but this soon wavers and the previous degree of unconsciousness returns. While *memory* for recent events is very faulty, particularly as regards their chronological sequence, that for remote happenings is usually well retained. This is especially true of conditions that personally interest them, *i. e.*, their family, their residence, their occupation, etc.

In addition to the two forms of delirium tremens already mentioned—the abortive and the well developed, or typical—there remains to be considered the so-called *wet brain* or *comatose type*. In an earlier paper,<sup>3</sup> to which attention has already been called, the manifestations of this aberrant form were discussed in some detail and need not be entered into at this time. Wet brain is usually an end stage of delirium tremens of the ordinary type, though occasionally it may develop without a preexisting delirium. Meningeal symptoms dominate the clinical picture, semicoma, generalized hyperesthesia, and muscular rigidity (Kernig and cervical rigidity) standing out prominently. The more marked the rigidity is, the graver is the prognosis. The cerebrospinal fluid in uncomplicated cases is normal. The mortality is nearly 75 per cent. Autopsy reveals no gross lesions aside from the more or less pronounced fluid accumulation in the pia-arachnoid space, a widening of the sulci and a narrowing of the cerebral convolutions.

*Differential Diagnosis.*—The diagnosis offers no difficulties, as a rule, in those cases in which a satisfactory history—chronic alcoholism, previous attacks—is obtainable, or in those in which the onset has been gradual and the course has been observed from the beginning. The undeveloped and the classical fully developed forms, even in the absence of an anamnesis, can usually be recognized if due attention be paid to the above-mentioned symptoms and etiological factors. The wet brain, or comatose type, presents particular difficulties when no history can be obtained. A further



difficulty is to determine whether, in a given case, even though the individual is undoubtedly alcoholic, the delirious or comatose picture is not due to some associated condition unrelated to alcoholism. Into this category, probably, falls the greatest number of diagnostic errors. And, finally, there may be present a combination of delirium tremens and some other condition with certain of the features of the former, such as delirium, disorientation, tremor, etc., the result being a complex extremely difficult of solution.

The possibility of *general paralysis of the insane* must be considered in the differential diagnosis whatever the type of delirium tremens one may assume to be present. Delirium, tremor, great motor and mental excitement, and a deep clouding of consciousness may be observed in both. Speaking for paralytic dementia is a history of a previously noted change of character, physical signs such as altered pupillary and reflex reactions, and above all characteristic spinal fluid changes. In paresis, furthermore, the disturbance of consciousness is on the whole more profound—except in comatose delirium tremens—and the individual is distinctly hazy as to his personality.

*Epilepsy* presents special difficulties in differentiation, first because epileptic seizures very frequently precede and accompany the attack of delirium tremens, and, further, because of the well-known tendency of alcohol, in the susceptible individual even in small doses, to bring on an epileptic fit. A history of previous epileptic seizures beginning in early life and not eventuating in delirium tremens may be considered good evidence *a priori* that the attack in question is one of true epilepsy. The so-called *epileptic befogged states* are less easily excluded, though they, as a rule, tend to display confused delusions of a religious character, contrasting with the more active hallucinations and the muscular tremor of alcoholic delirium.

In the *delirium of certain infections* the history and associated findings—the Widal reaction in typhoid fever, for example—may throw considerable light upon the picture. Consciousness is more deeply affected, furthermore, and the course is of shorter average duration.

The maniacal phase of *manic depressive insanity* may also enter into the differential diagnosis. One of the most important points in this connection—and often the only determining point—is the appearance of the transition to the hypochondriacal stage. Also of importance is the characteristic indecision of these patients.

*Brain tumor* is recognized by the history of long-continued pre-existing headache, of vomiting and of progressive mental deterioration, and by the bradycardia, the focal manifestations and choked disk. An examination of the ears will frequently lead to the diagnosis of a *brain abscess*. The recognition of a *meningitis* depends

to a great extent upon the findings in the spinal fluid. Lumbar puncture, indeed, is the only safe method in differentiating meningitis from the wet brain type of delirium tremens.

*Cerebral syphilis* can never be excluded without a careful analysis of the clinical picture and an examination of the blood (Wassermann reaction) and cerebrospinal fluid.

The possibility, finally, of a *skull fracture*, must always be considered, both as an accompaniment of delirium tremens proper or as the sole cause of the picture assumed to be wet brain. A history when obtainable may be of very great value here, as are also such findings as hemorrhages into the upper eyelids and about the mastoid processes, paralyses, abnormal tendon reflexes and pupillary anomalies.

It is evident, therefore, that while the diagnosis of a typical case of delirium tremens may be made without great difficulty if one relies upon the classical complex of symptoms, the task presents obstacles oftentimes insurmountable if alcoholism is merely one phase of the picture.

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- <sup>5</sup> *Jour. Amer. Med. Assoc.*, 1914, LXIII, p. 2186.
- <sup>6</sup> *Loc. cit.*
- <sup>7</sup> Alzheimer (*Centralbl. fuer Nervenheilkunde und Psychiatrie*, 1904, p. 437).
- <sup>8</sup> *Neurolog. Centralblatt*, 1912, XXXI, p. 60.
- <sup>9</sup> Graefe-Saemisch: Handbuch der Augenheilkunde, 1901, 2nd edit., Vol. XI, Part II, p. 24.

## ALCOHOL AND ART.

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O Whisky! soul o' plays an' pranks!  
Accept a Bardie's gratefu' thanks!  
When wanting thee, what tuneless cranks  
Are my poor verses!

—*Scotch Drink*: Robert Burns.

## I.

"Art proposes to itself an end," says Mill, "and looks out for means to effect it." That alcohol has been successfully invoked at times by creative artists in their efforts to seize and crystallize beauty and power, when other means have failed, is a fact easily susceptible of irrefutable proof. We shall close our minds in this study to all the controversial casuistries which have been applied to the problem of alcoholism in commonplace men, and whatever we shall establish, with respect to the ethylic facilitation of creative intellectual mechanisms in certain indubitable instances, must not be construed as advocacy of conscious utilization, even by peculiarly constituted men of genius, of this artificial agent. We must also detach ourselves from our accustomed contemplation of retributive pathologic consequences, even the final annihilation of the devotee. We are concerned with the creations and mechanisms of a Charles Lamb's alcoholized brain; in his wet cerebrum, as it lays on the dead-room table, we are not interested.

Alcohol ordinarily operates upon the organism as depressant or narcotic, paralyzing the inhibitory mechanisms that prevent the release, in a state of sobriety, of the impulses making for more rapid ideation, mellow geniality, foolish confabulation, et cetera. In the majority of geniuses its more familiar effects appear to be intensified, but there is a small group in which alcohol may, occasionally at least, release the spirits which give wings to the soul. As would be expected a priori, the delicately organized nervous system of the genius furnishes two types of hypersensitiveness, and accordingly we have special reactions. These idiosyncratic responses to alcoholic intoxication may be regarded as thoroughly established by a wealth of evidence, some of which we shall adduce; indeed, it would be intellectually dishonest to quibble about the inspiring effects of alcohol in specific cases. It is a fact that alcohol has made angels in an artistic sense as well as in a mortuary one.



Thus he who is inspired by alcohol is to his fellows as was Lady Macbeth to the king's guards:—

That which hath made them drunk hath made me bold;  
What hath quench'd them hath given me fire.

In Plato's "Republic" there is a striking figure of thought. Human beings are conceived of as creatures chained in a cavern with their backs to the light, which they are unable to see. Figures move behind them whose shadows on the cavern wall the chained people believe to be realities. Alcohol is one of the things which sometimes loosens the chains so that the cavern dwellers may turn and see the light and the actualities and true values of life, instead of the old illusions, and become as gods in insight and power.

Bateson conceives of evolution and life as "an unpacking of an original complex." All men have divine potentialities packed in them somewhere. A 'longshoreman' has the same essential equipment as a Shakespeare. So the genius, instead of being one to whom something has been added from without, is one who for some reason or other has experienced a release of his powers. In him the forces that mask the hidden faculties of commonplace beings are abated or lost. Alcohol sometimes paralyzes these forces, in the same manner as it loosens the chains of the cavern dwellers that Plato conceived human beings to be.

We shall confine ourselves in this study to that small group of geniuses of peculiar constitution whose spiritual and artistic powers have been liberated, at propitious times, by alcohol. We conceive it to be our business to register the evidence without inflicting gratuitous moralizings of irrelevant clinical lectures, or discussing the social pathology of alcoholism.

Naturally, ethylic inspiration has produced very uneven results. Its indirect quickening of wit, humor, imaginative fantasies and creative impulses has been more often capricious than sustained, and it "has caused in many writers a style characterized by eroticism and an inequality which is rather grotesque than beautiful, owing to too unrestrained fancy, frequent imprecations, and abrupt transitions from the deepest melancholy to obscene gaiety, and a marked preference for such subjects as madness, drink, and the gloomiest scenes of death." We must admit that Shakespeare's description of the effects of alcohol on the sexual powers applies, in a sense, to its effects upon many intellects:—

*Macduff.* What three things does drink especially provoke?

*Porter.* Marry, sir, nose-painting, sleep, and urine. Lechery, sir, it provokes, and unprovokes; it provokes the desire, but it takes away the performance: therefore much drink may be said to be an equivocator with lechery: it makes him, and it mars him; it sets him on, and it takes him off; it persuades him, and disheartens him; makes him stand to, and not stand to: in conclusion, equivocates him in a sleep, and, giving him the lie, leaves him.

It would seem that one must have suffered from Korsakow's psychosis, and retained one's memory of one's experience, to write in a style, as Gautier did, which "admits of shading, and these shadows teem and swarm with the larvæ of superstitions, the haggard phantoms of insomnia, nocturnal terrors, remorse which starts and turns back at the slightest noise, monstrous dreams stayed only by impotence, obscure fantasies at which the daylight would stand amazed, and all that the soul conceals of the dark, the unformed, and the vaguely horrible, in its deepest and darkest recesses." The alcoholic hallucinoses of Poe, a dipsomaniac genius, seem to have been deliberately utilized by him when sober as literary material. Alcoholic diffuseness and delirious ideation may often be observed in Tasso, Swinburne, Burns, Byron, Verlaine, Samuel Butler, Goethe, Baudelaire, Praga, Hoffmann, Byron and Rabelais. But we have to take these things along with the beauties. The peculiar companionableness of much of our poetry and prose has an ethylic significance.

John Fiske displayed much insight when he said that under the influence of alcohol imagination runs riot in such a way as to appear to be stimulated, when the fact is it is not stimulated but simply let loose. So mad does the play of his fancies grow that we find Verlaine incoherent in places. But these defects must not be over-emphasized, for it is a fact that whole works of consummate power and masterful consistence have been produced under the inspiration of alcohol. In many cases alcohol either does not induce marked cerebral incöordination, or else the artist learns how consciously to avail himself of certain effects and to avoid undesired ones. Then the artist sober is a check on and critic of the artist drunk.

It has been said that man drunk becomes man in possession of himself. So in the case of those with latent criminal instincts one sometimes notes a preoccupation with anti-social ideas the expression of which would seem to represent a vicarious satisfaction of vicious inclinations. Lacking the initiative or the full criminal impulse, as well as environmental determinants, such artists write about crime instead of committing it. Verlaine, the absinthe-inspired Symbolist, was an actual criminal of a most revolting type. Baudelaire, Guy de Maupassant and Poe wrote much of crime. Swinburne reveals a great interest in Sadism and other cruelties. "Anactoria" treats of the unnatural love of two women. It might be said that he eulogized crime. In "Before Dawn" he curses and reviles:—

To say of shame—what is it?  
Of virtue—we can miss it,  
Of sin—we can but kiss it,  
And it's no longer sin.

Swineburne's mysticism has been said to partake more of the depraved and the criminal than of the paradisiacal and divine. There are echoes of Baudelaire and Gautier in Swinburne, by whom he was admittedly influenced. Oscar Wilde wrote a biography of a famous criminal in which he praised the crook's work and appraised each act as though he were criticizing the work of an artist. Sherard, his biographer, ascribes all his brilliancies and vagaries to alcohol. Goethe confessed that if he had not learned to convert his wild fancies into artistic productions that bad consequences would have ensued. We have to tolerate the anti-social concepts that especially mark the work of certain artists of the ethylic school because even faulty ethics may be expressed in beautiful verse or prose, and it must be admitted that certain sinister themes lend themselves to peculiarly brilliant treatment, a notable instance being De Quincey's "Murder as a Fine Art."

But there is no end to the works of artists who depended much upon the "invisible spirit of wine" which betray none of the faults which we have enumerated—many, indeed, which reveal no faults of any kind. Let us view the *tout ensemble* of this alcohol-born art, which is really beautiful, and not be distracted by the warts and nævi upon its fair body. Let us take this vast heritage of beauty to ourselves joyfully, and count ourselves the most fortunate of mortals in its possession.

## II.

The subtle Alchemist that in a Trice  
Life's leaden Metal into Gold transmutes.

There has never been a time since Osiris, Bacchus, Saturn and Ceres disputed the honor of the invention of alcohol and its introduction among men when it has not played a part in the intellectual activities and cultural progress of the world. As to the orators, they very early availed themselves of its properties. Demades, contemporary with Demosthenes, found his inspiration in it. Down through the centuries its influence upon public men of great note and upon the affairs of nations has been incalculable ("Arbiter of peace and war"—Horace). And not wholly bad has been that influence, operating through artists in public speech; we are bound to say this as honest servants of truth, for did not Gladstone find it "especially necessary at the time of greatest intellectual exertion." Pitt and Fox deliberately prepared their speeches under the excitation of excessive indulgence in porter. In American political life in ante-bellum days there were few eminent personages who were not accomplished imbibers, and in the noble flights of oratory then delivered the ethylic tincture is often easily discerned. It is unnecessary to particularize.



Æschylus, creator of the perfect "Agamemnon," wrote his tragedies when intoxicated (Athenæus). Eupolis and Cratinus would never attempt composition until inspired by wine. Horace, in his nineteenth "Epistle," remarks: "Cratinus of old, Mæcenæus, held that poems destined to immortality were always inspired by wine; and from the earliest days poets have been toppers."

Old Homer himself, in the ninth book of the Odyssey, enthuses over the good wine which was the gift of Maron, the minister of Apollo, because of "the spirit it brought, to dare things high, and set up on end my thought."

Sings Chaucer:—

In Southwerk at the Tabard as I lay,  
 \* \* \* \* \*  
 Gret chere made oure hoste us everich on,  
 And to the souper sette he us anon:  
 And served us with vitaille of the beste.  
 Strong was the win, and wel to drinke us leste.  
 \* \* \* \* \*  
 And thereupon the win was fette anon.  
 We dronken, and to reste wenten eche on,  
 Withouten any lenger tarying.

The poet who chronicled the pilgrimage of 1388 to Canterbury and the shrine of Thomas à Becket was the son of a vintner; other relatives of Chaucer's were vintners. His father was a well-to-do wine merchant and not only made wine but kept one or more taverns. In the "House of Fame" Chaucer confesses to a delight in the pleasures of the table. Thomas Fuller accounts for his coat of arms as representing the dashing of white and red wines. On April 23rd, 1374, he was granted a daily pitcher of wine by the king. He stood in such favor in 1398 that the king granted him a tun a year.

Ben Jonson (the "Canary-bird"), the first patented laureate of England, was granted a tierce of canary wine annually. This grant was continued until the time of Pye. Laureates who depended upon this and other libations to inspire them were Davenant, Dryden, Shadwell, Nahum Tate, Rowe, Eusden, Cibber, Whitehead and Warton. Tennyson recorded his preference in "Will Waterproof's Lyrical Monologue" as follows:—

O plump head-waiter at 'The Cock,'  
 To which I most resort,  
 How goes the time? 'Tis five o'clock.  
 Go fetch a pint of port:  
 But let it not be such as that  
 You set before chance-comers,  
 But such whose father-grape grew fat  
 On Lusitanian summers.

The Goliardic poems of the Middle Ages are attributed to the Clerici Vagi, wandering students who considered themselves a

confraternity and burlesqued the institutions of the religious orders, obeying a 'primate,' or 'bishop,' to whom the nickname of Goliath was given at the period in which they flourished most. He was also alluded to as the Archpoet (Archpoeta). The personality of this Goliath is as obscure as that of Homer. Whether he was one or many is a mystery. These poems are devoted chiefly to wine and song. In them is an insistent note regarding the cause and effect relationship of these twain. Especially is wine celebrated as the parent of poetry. "Anacreon," says Symonds, "pales before the brilliancy of the Archpoeta when wine is in his veins, and the fountain of the Bacchic chant swells with gushes of strongly emphasized bold double rhymes, each throbbing like a man's firm stroke upon the strings of lyres. A fine audacity breathes through the praises of the wine-god, sometimes rising to lyric rapture, sometimes sinking to parody and innuendo, but always carrying the bard on rolling wheels along the paths of song. The reality of the inspiration is indubitable." From Symonds' translation of the "Confession of Goliath" we quote a few lines apropos:—

With the cup the soul lights up,  
Inspirations flicker;  
Nectar lifts the soul on high  
With its heavenly ichor:  
To my lips a sounder taste  
Hath the tavern's liquor  
Than the wine a village clerk  
Waters for the vicar.

Villon (1431-1463), that fascinating vagabond of letters, gained much of his inspiration from ethylic sources.

The veritable epidemic of alcoholism which occurred in the Elizabethan era in England was coincident with the great intellectual awakening of that age. Was it more than coincident? May there not have been a cause and effect relationship?

Shakespeare tarried much at the Mermaid Tavern with other famous Elizabethan artists. As there were no clubs or literary societies in those days about the only place where a poet could meet his friends for merry or edifying intercourse was an inn. That Shakespeare was thoroughly familiar with the effects of intoxicants through personal experience as well as through observation nobody can doubt who knows his Falstaff, his Sir Toby Belch and his Caliban. On February 10th, 1616, his daughter Judith married Thomas Quiney, a gentleman, by the way, engaged in the manufacture of alcoholic intoxicants. To celebrate the event Shakespeare entertained his two old cronies, Michael Drayton, the poet, and Ben Jonson, the dramatist, at New Place, and, according to the statement of John Ward, the vicar, "itt seems drank too hard, for Shakespeare died of a feavour there contracted."

Those old taverns and the goods dispensed therein played a great part in the 'spacious days' and long thereafter in the lives of literary artists. Christopher Marlowe's death in a tavern brawl and the fracture of Hogarth's nose in the Highgate inn where he conceived his grotesque scenes come to mind.

The real glories of the tavern school of writers begin with the Mermaid group, that marvellous Elizabethan galaxy including Shakespeare, Beaumont, Drayton, Ben Jonson and Fletcher, who appear to have owed much to the malmsey, sack and muscadel that they drank in the "charmed circle." It may easily be divined where Shakespeare got his atmosphere for the comic scenes of "Henry IV.," those madcap revelries in the Boar's Head Tavern in which Falstaff figures.

Souls of poets dead and gone,  
What Elysium have ye known,  
Happy field or mossy cavern,  
Choicer than the Mermaid Tavern?

*Lines on the Mermaid Tavern:* John Keats.

What things have we seen  
Done at the Mermaid! heard words that have been  
So nimble, and so full of subtle flame,  
As if that every one from whence they came  
Had meant to put his whole wit in a jest,  
And had resolv'd to live a fool the rest  
Of his dull life.

—Francis Beaumont.

We associate many famous literary characters of an earlier day with the inns that they frequented. You cannot think of Sir John Suckling without recalling the Bear Tavern in London.

Washington Irving fittingly celebrates for us "that temple of true liberty, an inn," and the same author prefaces his essay on the Boar's Head with the motto: "A tavern is the rendezvous, the exchange, the staple of good fellows. I have heard my great-grandfather tell, how his great-great-grandfather should say, that it was an old proverb when his great-grandfather was a child, that 'it was a good wind that blew a man to the wine,' " thus naively dodging the uttering of the heresy himself.

One feels, says James Fitzmaurice-Kelly, that Cervantes would have been an admirable third with Hal and Falstaff at the Boar's Head Tavern. Cervantes is never more himself, says this biographer of the great Spaniard, than when dilating on the wines of Esquivias. Cervantes himself, in the Prologue to "Persiles and Sigismunda," confesses that he "can no more give up drinking for pleasure than if I had been born for nothing else."

Dr. Johnson's famous club met at the Turk's Head, in Gerrard Street, Soho. He himself did not give up his convivial habits until he was fifty-seven, and could drink three bottles of heavy wine



"with impunity." Johnson took great delight always in the tavern clubs characteristic of the time. He first frequented the Old Street Tavern and in 1749 he formed a club which met at the King's Head, Ivy Lane. Goldsmith, with his "expansive and sympathetic character open to social impulses" came to this group with an impressive record for conviviality at Trinity and Edinburgh. It is said that he once got drunk on a guinea sent by Johnson to rescue him from hunger.

Smollett took kindly to tavern life and shone as a raconteur in the coffee-houses. His house was open on Sundays to his brethren of the quill, and much wine, punch and Calvert's butt-beer were swizzled there. His contemporary, Fielding, chewed tobacco and drank champagne "simultaneously."

Diderot was a member of a Bohemian French set who dined at the baron D'Holbach's to listen to the brilliant writer and philosopher's wild talk. He was a fertile, suggestive and daring thinker and talker. This group met about the same time as the Bohemians who supped at the Turk's Head with Johnson.

Addison spent much time in coffee-houses and taverns with Pope, Swift and Steele. He kept a bottle of wine at each end of the long gallery at Holland House, where he walked back and forth perfecting his thoughts; consciously or unconsciously he took a glass at each turn, until wrought up to the required point. Pope found their prolonged sittings too much for his health; he was addicted to spirits, which shortened his life; to a letter that Gay wrote to Congreve he added: "I sit up till two o'clock, over bungundy and champagne." Addison's tiple was canary wine and Barbadoes water; he drank excessively. Steel wrote in the *Tatler* that "when he [Addison] arrives to his pint and begins to look about and like his company, you admire a thousand things in him which before lay buried." He was charming when once the ice was broken by alcohol. Dryden was much in the habit of drinking with Addison.

The *Tatler* was a coffee-house and tavern product—declared to be by Steele himself; what the *Spectator* owed to alcohol is patent enough.

John Gay, the inventor of comic opera ("The Beggar's Opera") and close associate of Addison, Steele, Pope, Swift, Congreve, Cibber, Arbuthnot, Hogarth and Walpole, discovered when he was about twenty-two that wine facilitated his poetic expression to an extraordinary extent. Throughout his life he consciously availed himself of the circumstance. Gay's latest letters show that to the end of his life he never ceased to realize very clearly the peculiar effect of alcohol upon him. In March, 1730, we find him telling Swift: "I continue to drink nothing but water, so that you cannot require any poetry from me."

Matthew Prior was a heavy drinker. He frequented an alehouse

in Long Acre kept by a Bessy Cox. In a letter of Arbuthnot, we note the phrase: "We are to have a bowl of punch at Bessy Cox's."

Lord Bacon was in the habit of heating sherry and inhaling its vapor before writing.

Robert Herrick's poems are stamped with an ethylic impress that recalls Horace and Anacreon. In certain respects he rises above all his brethren among the Caroline lyrists (1591-1674). He has been called a respectable British Bacchus. By many critics he is ranked next to Shakespeare and Burns as a natural lyrist. There is a characteristic spontaneity and *abandon* about his verses. One finds the joys of wine sung by Herrick in "Ceremonies for Christmas," "Twelfth Night," "The Wassail," "The Wake" and "Harvest Home."

Speaking of Anacreon brings to mind the author of those odes, written in the sixth century before Christ, which have been called the most polished remains of antiquity—all beauty, all enchantment. The singular beauty of style displayed in these famous odes has been feebly imitated ever since their creation. Inspired by alcohol and addressed chiefly to it, they are among the most charming and facile expressions of the ethylic Muse.

Anacreon reminds us of that other glorious pagan, Omar Khayyám, he of the Rubáiyát. It appears that Omar's Government asked him how it could best assist him. "Place me," replied Omar, "where . . . wine, in abundance, may inspire my muse." He was accordingly pensioned and assigned to the fertile district of Nishapur. Thus there can be no serious doubt as to one of the sources of Omar's inspiration and of the esteem in which that source was held by him who wrote:—

I wonder often what the Vintner's buy  
One half so precious as the Stuff they sell.

and who exclaimed:—

Ah, with the grape my fading Life provide,  
And wash the Body whence the Life has died,  
And lay me, shrouded in the living Leaf,  
By some not unfrequented Gardenside.

One may choose between Omar's:—

A Book of Verses underneath the Bough,  
A Jug of Wine, a Loaf of Bread—and Thou  
Beside me singing in the Wilderness—  
Oh, Wilderness were Paradise enow!

and Robert Burns's:—

Fortune! if thou'll but gie me still  
Hale breeks, a scone, an' Whisky gill,  
An' rowth o' rhyme to rave at will,  
Tak' a' the rest,  
An' deal't about as thy blind skill  
Directs thee best.

Burns, who composed "by the lee side of a bowl of punch, which had overset every mortal in the company except the hautboy and the Muse," apparently found that different planes of intoxication, so to speak, merely inspired him in different ways. On one plane "it kindles wit an' waukens lear," on another "it inspires me, till I lisp an' wink, to sing thy name," and on another it "clears the head o' doited Lear." Alcohol never seems to have disappointed his expectations. How different from Samuel Butler, the author of "*Hudibras*," who "appeared flat and heavy after his first bottle; at the second bottle brisk and lively, full of wit and learning, and a most agreeable companion; but before the third bottle was finished he would sink into such deep stupidity and dulness, that hardly anybody would have believed him to be the author of a book which abounded with so much wit, learning and pleasantry."

"Lamb," says Augustine Birrell, "used to get drunk somewhat too frequently. . . . He was too fond of gin-and-water. He once gave a lady the welcome assurance that he never got drunk twice in the same house. . . . An occasional intoxication which hurt no one but himself, which blinded him to no duty, which led him into no extravagance, which in no way interfered with the soundness of his judgment, the charity of his heart, or the independence of his life, and a shower of bad puns—behold the faults of Elia!" As was the case with Sheridan and Pope, a very small amount of alcohol affected him profoundly. As he grew older there was an increasing need of it to set his wits at work. There is an obvious significance in the expansive geniality of the "*Essays*."

Leigh Hunt says that Byron often worked all night in the ardor of composition and drank a sort of grog made of Hollands and water—a beverage in which he indulged rather copiously when his muse was dry (Galt). "*Don Juan*" was written under the influence of gin.

Victor Hugo and Heine drank circumspectly. The effect of alcohol upon them is conjectural. "Balzac from time to time did not fear to drain a beaker to the lees. He ate . . . and drank in a Pantagruelic fashion. Four bottles of the white wine of Vouvray . . . gave only a more lively sparkle to his gaiety." Schiller drank vast quantities of Rhenish wine. Richard Brinsley Sheridan could not write except when under the influence of wine, nor make a public speech unless he had swallowed half a tumbler of raw brandy. Charles Dickens was a reckless drinker.

That inspired singer Tom Moore is one of the greatest panegyrists of the divine fluid which has such "mighty power o'er the flame within us," that "electric flame" which

Ne'er so swiftly passes,  
As when through the flame  
It shoots from brimming glasses.



In "Fill the Bumper Fair" Moore accounts for our soul's inheritance of the "ennobling thirst" for wine's celestial spirit, where-with we may draw down all the lightning from the heaven of wit, in the following poetic fashion. Upon that day when Prometheus stole away the living fires that warmed us the careless youth took no cup to hide the pilfered fire in, but, to his joy, found in heaven a bowl of Bacchus lying:—

Some drops were in that bowl,  
Remains of last night's pleasure,  
With which the Sparks of Soul  
Mix'd their burning treasure.

Hence the goblet's shower  
Hath such spells to win us;  
Hence its mighty power  
O'er that flame within us.

Very much of Moore's inspiration seems to have come out of wreathèd bowls. He was a true disciple of Anacreon, who wrote:—

When I drink, I feel, I feel,  
Visions of poetic zeal!  
Warm with the goblet's freshening dew,  
My heart invokes the heavenly Muse.

"Anacreon is not the only one," says Longepierre, "whom wine has inspired to poetry." There is an epigram in the first book of the "Anthologia" which begins thus:—

If with water you fill up your glasses,  
You'll never write anything wise;  
For wine is the horse of Parnassus,  
Which hurries a bard to the skies.

Among the ancients singing praises of the inspiring effects of alcohol we find Li Tai-Peh, called the Chinese Anacreon, the prince of poetry and the immortal who loved wine. Liu Ling appears to have been a disciple. Avicenna, the great Arabian physician, who wrote one hundred treatises, among them the "Canon of Medicine," which gave him his European reputation, was a drinker throughout his lifetime. As a student he used wine freely to enable him to study far into the night. Among the Roman writers we find many eloquent in praise of wine. Catullus has been called the prototype of Burns in the ancient world; they were sharers of the same "quintessential flame." Ovid affords another example of ethylic inspiration. Horace writes his odes to Bacchus "rejoicing tumultuously in my breast filled with wine . . . Bacchus, whither art thou hurrying me, full of thy power? Into what groves, into what caves am I driven, moving rapidly under a new inspiration? In what caves shall I be heard essaying to enrol the undying renown

of the illustrious Cæsar among the stars and in the council of Jove? I will send forth a noble strain, new, as yet unuttered by other lips. . . . I will say nothing insignificant, or in a humble strain, nothing doomed to perish. O Bacchus! it is delightful danger to follow the god who encircles his brows with the verdant vine-leaf."

Socrates, Seneca and Julius Cæsar were anything but teetotalers. Alcibiades' great abilities included a great capacity for wine. Horace says that the elder Cato often "warmed under wine."

Cardan, the eminent physician, mathematician and poet, author of "*De Vita Propria*," was a hard drinker. Codazzi, under the influence of alcohol, undertook to compose music with the help of the calculus. How well he succeeded in this branch of applied mathematics we do not know. We know that Tasso was badly addicted. Can Master Rabelais, author of the epic of the sixteenth century, great physician, and natural ancestor of Voltaire, be imagined sober? Praga, singing the praises of wine, blasphemed thus: "Let it come—the reproach of the sober man; come—the contempt of the human race; come—the hell of the Eternal Father: I will go down into it with my glass in hand." Hobbes, author of "*Leviathan*," was oftener drunk than sober. Richard Porson, the first scholar in Europe of his time, was also the most distinguished drunkard. He would drink liniment if nothing else was handy. Samuel Parr, another noted scholar, could drink two bottles "without any inconvenience." Charles Churchill, Thomas Parnell, Richard Savage, William Somerville, Murger, Kleist, Helius, Hoffmann, Cowley, Thomas Carew, Blackstone, Richard Burton, Majláth, Gérard de Nerval, Robert Treat Paine, Alfred de Musset and Hartley Coleridge swell the alcoholic company. De Quincey and Samuel Taylor Coleridge drank quarts of laudanum weekly, and the alcoholic content thereof must be reckoned with. Dante Gabriel Rossetti took whiskey with his chloral. Wilson ("*Noctes Ambrosianæ*") was recommended by Scott for a professorship at Edinburgh on condition that he "leave off sack." Thomson, he of the "Seasons" and "Rule Britannia," knew how to push the bottle; old wines and Scotch ale appealed to him; "he was dull until excited by wine." Lionel Johnson was a devotee; he gave us "*The Dark Angel*," a lyric faultless in expression. Oliver Wendell Holmes and Herbert Spencer confessed to the effect of alcohol in facilitating their ideation in company. Goethe boasted that he had drunk fifty thousand bottles of wine in his lifetime. Bayard Taylor, John Stuart Mill, Washington Irving and Thackeray were wine drinkers.

Francis Grierson, the brilliant English essayist, likens Emerson's writings to a plot of ground sown with lilies and other white flowers, without perfume. "A few of Omar's perennial roses, and a little of his wine, would have given color and fragrance to the

garden and some passion to his prose," for "pure wine sharpens the wit and gives power to the wings of genius."

Through wine, says Edgar Lee Masters in his "Spoon River Anthology," the soul, hungering for divinity, reaches the ecstatic vision and sees the celestial outposts.

Among composers we find Dussek, Handel and Glück. The last named used to say that he loved money, wine and fame for an excellent reason: the first enabled him to obtain the second, and the second, by inspiring him, procured him fame. He could not compose except under the influence of champagne. But besides wine he liked brandy, and one day he drank so much that he died of it.

The painters have a long alcoholic tradition. Caracci, Adrian Brouwer, Jan Steen and Barbatelli were accomplished drinkers. Frans Hals did his most striking work when most in the clutches of drink. Turner was a tremendous drinker and producer. George Cruikshank was converted to teetotalism by his own series on "The Bottle," but his successes ended with the conversion. Morland's life was a combination of hard work and hard drinking; when sober his work was mediocre; he was a prodigious worker and usually finished two pictures a day, though once he painted a large landscape with six figures in it in the course of six hours; in the last eight years of his life he painted about 790 pictures and executed hundreds of drawings; his terms were four guineas a day and his drink; in the course of his lifetime he completed about 4,000 paintings. Phil May, the black and white artist of *Punch*, whose droll illustrations of Bohemian scenes highly amused the past generation, was a most valiant drinker; a curious amiability and gentleness were induced in him by alcohol and may be found reflected in his work.

We shall close this section of our study with the following whimsical lines written by the late Victor Daley, because they seem to express the psychology of many of our vine-wreathed artists:—

I pity him who has not swung  
The Thyrsus in the air,  
And followed Bacchus, blithe and young,  
With vine-leaves in his hair;  
And heard the Mænads sing,  
And the mad cymbals ring.

### III.

Set not thy foot on graves,  
Hear what wine and roses say!

"Alcohol," says Jack London, "is the august companion through whom one walks with the gods; leading to truth naked, and to death; giving clear vision, and muddy dreams; the enemy of life,



and the teacher of wisdom beyond life's vision. . . . It illuminates the brain by a clear, white light; makes one a lord of thought, the master of one's vocabulary and of the totality of one's experience, unerringly capable of selecting data and building up one's exposition of life . . . alcohol reveals the so-called truths of life as lies; the drinker of imagination and vision strips away the husks of life's illusions and gravely considers the iron collar of necessity welded about the neck of his soul; he transvalues all values." Even when alcohol has not inspired this writer it has conserved his energy by rearing a wall of inhibition in his brain between the day's work done and the rest of the day of fun to come (London works only in the morning). He confesses that ultimately in his case he could do no work without drinking. "When, in despair, I took my drink, at once my brain loosened up and began to roll off the words." One cannot deny to London a certain rough power and style. To him alcohol has been the messenger of truth beyond truth and has furnished him with maggots of fancy and dreams of power; around him it has piled the books by which we know him as a virile writer and a more virile man.

In "The Quest of the Golden Girl," which is largely autobiographic, Richard Le Gallienne confides that sherry fortifies the romantic side of his nature. Hock, he says, is full of fancy, and all wines are by their very nature full of reminiscences, the golden tears and red blood of summers that are gone. In "Omar Repentant," also obviously autobiographic in character, Le Gallienne indulges a remorseful mood and utilizes his depressive experiences artistically. Le Gallienne does not appear to be equal to sustained work, and both his style and his ethics show markedly an ethylic twist which in his case is rather unfortunate; yet it may well be that, but for alcohol, the poetry of Le Gallienne, such as it is, had never been.

Because of London's avowal and Le Gallienne's mania for revealing his personal life in his works we are free to cite these two authors from among those living who, seeking inspiration, woo that source of it which

Comes stealing through the Dusk an Angel Shape  
 Bearing a Vessel on her Shoulder.

But a later chronicler must tell us about contemporary artists more reticent at present than London and Le Gallienne and whom we therefore do not feel at liberty to discuss. But it is our conviction that there will be less to tell as time goes on than we have told. We have written very candidly about the ethylic inspiration of "souls of poets dead and gone" because it seems to be practically a closed chapter in human experience. It holds mainly an academic interest to-day, since literature is all but dead at the hands of com-

mercialism. Why dynamize it through any means, even the nectar of the gods, for a thoroughly sordid publishing *market* that will have none of it and a public that would not be able to identify it? Highly respectable "linnets singing on the wrists of kings" (and captains of industry) we shall have, but in the aisles of time no organ voices shall be heard again. The horns of our intellectual elfland blow faintly and no new planet swings into the ken of the watcher of the skies. Our Kultur has razed the cathedrals of the mind and only the squeak of the field mouse is heard over the ruins of our once mighty temples. Where once the wine-presses of Horace and Anacreon stood we shall manufacture synthetics. Fairy forests are in process of conversion into subway shorings. Our poets, standardized by a Rockefeller Board, shall sing of the munition factory and the energies of gasoline.

115 Johnson St.

## THE INFLUENCE OF ALCOHOL ON THE PROGENITURE.

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The problem of inheritance has presented from time immemorial great difficulties for its solution. With the advent of Darwin's laws of natural selection ("Origin of Species") in 1859, it received its first scientific orientation. Later it was observed that the significance of variation in individuals and species could no longer be established on the basis of the Darwinian doctrine. Weismann, for example, insisted on proofs for the Darwinians' claims with regard to acquired characteristics, which the latter believed may be transmitted by parents to offspring. DeVries was one of the first who called attention to the important rôle of 'unit-characters' in hereditary transmission. Mendel was the next to demonstrate experimentally the latter contention, so that presently the conception of unit-characters is considered by most competent observers as the fundamental basis of modern evolutionary ideas. In spite of the correctness of Mendelian laws in their general aspect, the study of inheritance in man with regard to normal characteristics is nevertheless still far from being accomplished in all its aspects. Some advance has been made in the study of a few features, such as color of the eyes, the color and general character of the hair, of stature. But unlike animals or plants in which the rules are simple, in man a great multiplicity and diversity of factors have an influence on the transmission of normal hereditary characteristics, which therefore renders the problem quite complex. The study of abnormalities and of pathological conditions has been more fruitful. The reason of it undoubtedly lies in the facility with which striking dominant factors can be elicited and traced from generation to generation. Thus various forms of cataract, night-blindness, glaucoma, coloboma, skin and hair affections, supernumerary fingers and toes, syndactyly have all been traced through several generations of the same family. Thomsen's disease, pseudo-hypertrophic muscular paralysis, diabetes, hemophilia, Friedreich's cerebellar ataxia are the few affections which have been studied from this standpoint.

More elaborate studies have been made on the transmission of morbid hereditary features in mental deficiency and psychoses. The studies of Cannon and Rosanoff\* indicate strongly the influence of

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\**Jour. Nerv. and Mental Dis.*, 1911, p. 272; *Amer. Jour. Insanity*, Vol. LXVIII, p. 221.



neuropathy on the offspring in several successive generations. It is evident that there exists in the original parent germ-cell definite factors or determiners which possess the power of transmitting certain characteristic units, and that no individual can transmit to the offspring a unit-character which he or she has not possessed.

Among various agents which are capable of deteriorating the germ-cells and thus produce a lasting alteration in the hereditary energies of these cells, which will be manifested in anomalies and defects involving the embryonal development of various organs, syphilis and alcohol occupy a most conspicuous place. We shall be concerned here exclusively with the effect of alcohol on the progeniture.

In collecting data concerning heredity, too great caution cannot be taken. No matter how careful one may be in obtaining information from the family, certain reservations must be made with regard to uncertainties and to the tendency to restraint in some members of such families in revealing matters concerning individual characteristics. Besides, not only alcohol, but also other factors may create pathological conditions so that it is sometimes difficult to ascertain which of them belongs to alcoholism itself, which to other causes, and which to both. Despite the obstacles mentioned, despite the frequent association of alcoholism with other serious morbid tendencies, it is possible, nevertheless, in some cases to obtain sufficiently precise information from a considerable number of observations.

The three series of pedigrees presented here come from families about whom the most careful investigation with regard to other pathological conditions has been made. The information about the medical histories of several generations was obtained from the near and distant relatives with whom a correspondence was kept up for many months. Diseases, infection, or intoxication other than alcohol could not be traced as far as the statements of the members of the families could be relied upon. Every one of the surviving members of the last generation was submitted to a Wassermann test of the blood-serum and spinal fluid, and the results were negative. It appears that alcohol was the sole or at least the most conspicuous agent that created the abnormalities in several successive generations.

In Table I besides the strong alcoholic element in the grandfather, there is also an element of consanguinity: the mother married a first cousin. With this single exception the remaining abnormal members of the large family can with reasonable accuracy trace the various defective characteristics to the parents' and grandparents' chronic alcoholic intoxication.

In the three generations we find individuals with various degrees of mental deficiency, epilepsy, choreiform movements, tremors, ec-

TABLE I (a)  
Great grandfather (alcoholic); Great grandmother (normal);

Philipp—wife (alcoholic) (undersized)	
2 dead born;	Thomas—wife (normal);
John; (died at 4)	George; (feeble-minded) (epileptic)
Wilbur; (tubercular) (died at 12)	Mary; (backward) (age 10)
	dead born; Sarah; (epileptic) (age 19)
	Carl; (sommambulism) (age 15)

TABLE I (b)  
Great grandfather (alcoholic); Great grandmother (normal);

John (alcoholic)—wife (normal); (eccentric; violent temper)	
2 miscarriages;	Sadie (age 10); (normal)
John (age 17); (nystagmus, choreiform movements)	Bessie (age 8); (normal)
Mary; (epileptic) (single)	Eleanor (normal); (husband normal but first cousin)
	Anna; (chorea) (single)
	Herbert; (backward) (single)

TABLE I (c)  
Great grandfather (alcoholic); Great grandmother (normal);

Elizabeth; (backward) (single)	
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TABLE II (a)

Grandfather (alcoholic);	Grandmother (normal);
Andrew—wife normal (alcoholic)	
Mary; (died at 2 months from meningitis (?) in convulsions)	Susan (age 21); (epileptic)
	Dorothy (age 10); (vicious; masturbates)

TABLE II (b)

Grandfather (alcoholic);	Grandmother (normal);
Mary—husband normal;	
2 miscarriages;	Anna (age 16; backward)
	John (age 19); (somnambulist)

TABLE II (c)

Grandfather (alcoholic);	Grandmother (normal);
Nelson	
Robert (age 9); (normal)	Fred (age 11); (violent temper, bloodthirsty, persistent headache)
	Sarah (age 13); (epileptic)

TABLE II (d)

Grandfather (alcoholic);	Grandmother (normal);
Jane; (defective memory; choreiform move- ments)	



TABLE III (a) Grandfather (alcoholic); Grandmother (normal);

Carl—wife normal;  
(weakling, small,  
headache from  
childhood)  
(alcoholic)

Three still-born children  
Thomas (age 7);  
(choreiform movements)  
Marie (age 11);  
(somniaambulism;  
enuresis)

TABLE III (b) Grandfather (alcoholic); Grandmother (normal).

John (single);  
(violent temper;  
could not keep  
position)  
Frank (single);  
(epileptic)  
Marie (single);  
(chorea)

TABLE III (c) Grandfather (alcoholic); Grandmother (normal);

Robert (single);  
(normal)

TABLE III (d) Grandfather (alcoholic); Grandmother (normal);

Jennie—husband alcoholic;  
(masturbated  
even after marriage)

Hobart (age 6);  
(normal)  
Sarah (age 16);  
(thief, was  
away from  
home)  
Elizabeth (age 13);  
(coloboma of left  
eye; mentally  
deficient)  
John (age 10);  
(epileptic)

centricity and violent temper; we find also miscarriages and dead born children. There are only two apparently normal children. Alcoholism was present in two generations—namely, in the great grandfather and in one of his sons who married and brought into the world four living children and two dead born. The youngest died at four, one developed tuberculosis at twelve, one was feeble-minded, and one was epileptic. A glance at the pedigree will show the remaining ravages. In the entire family tree, alcohol seems to be the only pernicious agent.

In Table II alcoholism was present in the grandfather and one son. The latter had three children, of whom one died at six months from meningitis (?), one is epileptic, and the third is a masturbator. The other children of the grandfather were not alcoholic but abnormal, and two of them were married and gave birth to several defective children.

In Table III the family tree is traced from the grandparents, one of whom was profoundly alcoholic. Out of six children only one was normal, but he never married. Of the others, two married and gave birth to several defective children and one normal child.

It was mentioned above that these three families were submitted to a most careful investigation with regard to all possible pathological conditions, and that the surviving members submitted to a Wassermann test gave negative results. Alcoholism was very much pronounced in some members of the families. It appears to be reasonably certain that alcoholism alone can be incriminated as a direct cause of the striking abnormalities traced in the several successive generations.

Some of the offspring are still under observation, and every effort is being made to prevent marriage of those who have reached adult age.

The conclusion to which these exceptionally striking pedigrees lead, although small in number, is that alcoholized individuals procreate defective children. These in their turn, if permitted, continue the chain of the pathological condition. One such family is capable of throwing into the community dozens of useless or dangerous individuals, who, if capable of multiplying, will produce their like. If by depopulation is meant loss of individuals not only in a quantitative but also in a qualitative sense, alcoholism is undoubtedly one of its causes.

A BRIEF CONSIDERATION OF SOME MENTAL CHARACTERISTICS OF THE NARCOTIC HABITUE AND A SUGGESTION FOR A FEATURE IN MANAGEMENT.

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By HENRY BEATES, JR., M. D., of Philadelphia.

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To one fact, constituting a profound truth, that conditions and modifies conduct to the foundation of individuality, Holy Writ directs attention with these words: "As a man thinketh, so is he!"

As man concludes, so does he act, and, because of this, it is possible to estimate character approximately correctly, and render practicable the establishment of those relationships of man with man, upon which order, law, development, progress, in a word, society, in its largest sense, depends. For the purpose of this consideration we may group the attributes of the psychical into three: (1) The emotional; (2) intellectual; and (3) volitional. By alluding briefly to certain phases of these we may demonstrate how and why, the individual, because of the inevitable relationships existing between these, and considered from the standpoint of sociology, constitutes a force either for good or evil. He is, therefore, a power contributing either to the 'uplift' or the degradation of humanity. What an individual is, is the result of antecedent as well as contemporaneous influences. These influences may be designated,—causes. Contemplate at this juncture the law of heredity! What is the type of brain with which the child is born? Its 'inclinations' for the intelligent observer, constitute a complete demonstration. Action—what one does, and in what manner, and how the individual reacts to influences—demonstrates character. At this point, bear in mind the awful reality of the law of development. Its unescapable consequences, always developmental in type, prove it to be equally potent for augmenting the evil as well as the good. This fact is too commonly unseen, that is, the evil grows and develops in response to the fundamental principle as does the good, when influences favorable to growth and development operate. A little thought given to this inexorable truth is invaluable when contemplating the treatment best suited for the victim of a narcotic habit. Knowledge of the sciences of structure and function is essential in order intelligently to apply the involved fundamental principles to each individual case, as the recognized conditions demand; in a word, the person must be understood and his or her tendencies known. The point in view is perhaps made clearer by quoting the words of Emerson: "Character is the habit



of action from the permanent vision of Truth. It carries a superiority to all the accidents of life; domesticates itself with strangers and enemies. It compels right action to every other man." The Golden Rule is thus beautifully explained. Observe that this defines noble character. Prof. Horatio C. Wood defines character,—and it applies with equal force to the noble and ignoble,—to be "the established equilibrium existing between the emotional, the intellectual and the volitional." The profound significance of this definition is at once apparent when we recognize that all impulses originate from the emotional and that the intellectual interprets with unerring accuracy whether the impulse is right or wrong. The volitional by complex processes not necessary to elaborate here, finds the individual either a slave of impulse or a master of impulse. Here lies the battle-ground of individuality and, indirectly, the foundationing of society in its largest sense. Heredity finds the child born and unavoidably possessed with a brain, so constituted that the emotional naturally inclines to impulses, either of good or evil type. The influences of environment in stimulating the development of either the good or evil constitute a powerful force, which must be well understood when treatment for the narcotic habit is to be formulated. The point here desired to be presented is well seen in the oration on Congressman Gustave Schleichter by Garfield, who thus expressed it: "Character is the result of two great forces: the initial force which the Creator gave it when He called the man into being, and the force of all the external influences and culture that mould and modify a life!"

A physiologic law must now be understood—namely, when the emotional is excited the judgment is in abeyance. Constant effort must be made to neutralize this effect.

Tissues endowed with the higher functions of man such as the brain, heart, etc., respond to the most trivial exciting influences with the same intensity as though brought into action by a relatively more powerful excitant. It is plain, therefore, why impulses which originate in the emotional may be rendered active in some types of brain which in others would be without any apparent or recognizable effect. Conduct, reaction to environment, therefore, is largely determined by the inherent sensitiveness of individuals, and for correction requires environment that must be favorable to the peculiar demands of the individual, *while developmental influences either plus or minus are being utilized*. Anger, and its action is rendered active and predominating in some persons by an excitant to an extent that appals and startles, which in others would find no response to many times the intensity of the exciting influence, illustrates the point set forth. It is because of this susceptibility that the highly organized and sensitive intellectual characters are prone to the narcotic habit. Men of action, achievement

and progress feel the wear and tear of responsibility. They experience mental pain, an actual agony, and because narcotics blunt the sensorium we find them used for evident reasons. Narcotics when first used relieve the wearied brain because they possess a special affinity for action upon the tissues of higher functions; and stimulating the structures which are imperative in men of great deeds, finds them when fatigued, resorting to narcotic stimulation in order to be bridged over. Crises met are thus unfortunately successfully sustained by the use of alcohol, morphia, cocaine and similarly acting poisons. By such types of brain too frequently is the law of habit regarded as escapable, because of the very fact that it is understood and hence, alas! is the danger incurred,—and with what consequences only too many mental, moral and physical wrecks or degenerates testify!

Habit is the unescapable consequence of *repetition*. This fact should be burned in, as it were, on the minds of everybody. That destructive habit and constructive habit equally result from repetition constitutes a fact that indicates a plan for treatment, *i. e.*, repetition of resistance intelligently and judiciously applied. Narcotics affect some mental faculties more powerfully than others, and, to some degree, all. Cocaine possesses a specific affinity or special power to stimulate the reasoning faculties and activity of thought. In this not sufficiently recognized fact lies the danger of its use, and the inclination to resort thereto upon the slightest provocation. Thought and reason rapidly lose sensitiveness to the drugs; hence the necessity of larger quantities for parallel effects.

Those cognizant of these facts deceive themselves into believing that crises can be successfully overcome, and the danger of becoming enslaved, avoided. Everybody should be taught that no narcotic can be used even once, and the equilibrium existing between the emotional, intellectual and volitional not be, at first, seriously disturbed. At first the use of  $\frac{1}{10}$  grain may relieve the fatigued brain and stimulate the overtaxed reasoning functions sufficiently to solve a presenting problem. But reaction is certain to follow—and as conditions continue to demand the exercise of ability—the then doubly fatigued brain is only too easily whipped into disproportionate activity by  $\frac{1}{10}$  grain. No, that is not sufficient and a  $\frac{1}{5}$  grain is used. Thus step by step the deluded and ambitious leader grapples with responsibilities and soon finds himself in action with 5 grains as the now necessary quantity. By this time the poisonous properties of the drug have blunted the intellectual. The moral is now included and a character noted for integrity and reliability becomes weak and indifferent.

His emotional has assumed the abnormal, and a victim to narcotism is added to the army of degenerate characters. Soon a poisoned emotional establishes an indifferent being, blunted to the sense

of duty and careless as to the discharge of responsibilities: important duties are postponed, or forgotten, and society recognizes that the one time man of force, usefulness and prosperity has lost interest in the affairs of life and is neglectful of personal as well as of the interests of those for whom it was his duty to care. He becomes unreliable, and step by step descends to lower and lower levels until, practically, void of all sense of self-respect and honor, he becomes the playground in which morbid emotionalism runs riot and dominates the intellectual and volitional. He soon degenerates into an intellectually weak creature, whose volitional is impotent to influence effort to avoid the destroying narcotic. Now he is a mere mass of living structure, surrendered to narcotic illusion and dream, oblivious to surroundings and morally blind to the demands of self-respect, duty and decency. To obtain the drug resort is had to any means—subterfuge, the lie, and as a last resort, frequently, the perpetration of crime which finds him either in prison or because of the resulting insanity an inmate of the asylum. What is his influence upon the consequences of heredity and on society? Language fails to describe the far-reaching and destructive results. Think of the crimes of passion, narcotic degenerates commit! Contemplate the destruction of the minds of youth and even of our school children, which these moral lepers cause! By common consent murder is admittedly justly punished by capital punishment. What should be the punishment of those who murder the mental and moral attributes of fellowmen and in so doing allow the victims of the narcotic habit to live as centres of the most destructive influences of man? Surely life imprisonment or capital punishment should be the penalty! What of that conscienceless criminal, who, not a narcotic degenerate himself, engages in the sale of cocaine to the victims of this soul destroying drug, for the possessing of gold, and who for the acquisition of wealth murders the mental, moral and social life of his fellowmen? The time is for society at large to demand the enactment of laws that will render practicable either the life imprisonment of such immoral monsters, or their destruction. What of the manufacturer and seller of alcoholic liquors? Should not the State be held financially responsible for the ruin and destruction caused by such a nefarious business which it licenses individuals to conduct? Bearing in mind that the development of noble character is secured by educational methods, yet to be formulated, which through the application of the fundamental principles, briefly outlined, will establish that normal equilibrium which should exist between the emotional, the intellectual, and the volitional, effort should be made to supply for narcotic habitués institutional opportunities for the 'education' of their character. Contemplate the picture which the characteristics of the narcotic victim portray. Most conspicuous is superlative selfish-



ness. His habit of thought and speech are egoistic. One thought prevails, and that is seeking comfort by narcotic unconsciousness. Either his activity or passivity has but one purposive end—gratification of his whims and selfish desires! No matter at what cost, distress or suffering others may endure through his shortcomings, the debauches and sprees are indulged at every opportunity.

If noble emotions are still in evidence, the weakened volitional finds him incapable of resistance, and surrendering before what seems to him to be too great an effort to avoid indulging the morbid and overpowering impulse. Thus step by step, from the beginning of his disastrous career, does the narcotized brain overpower the intellectual with emotional impulses of a degenerate type, to which, because of a narcotic destruction of will power to resist, he becomes a helpless and impotent slave, temporarily suffering indescribable mental agony with each debauch, but indifferent to the demands of duties whether of self, family, home or society. It is the home where the infant is too commonly indulged by an over-affectionate parent, who gratifies every wish and whim, that so frequently develops selfishness and fails to influence the cultivation of self-control and the exercise of a healthy and adequate will power. The overindulged and spoiled child supplies in the adult the most fertile soil for the establishment of the narcotic habit. Children should be exercised and trained in the cultivation of self-control and in the effort to secure by purposive action, normally formulated, that which they wish to possess. It is during cradle life that by intelligent and kindly treatment the infant could be taught not to expect every whim and wish to be gratified, and to experience contentment and happiness when not supplied with everything wished for to entertain and pacify.

The same fundamental principles of growth and development must be the means through which minimizing the narcotic habit can be achieved, and the public should be educated to understand thoroughly the necessity of having established through the enactment of proper statutory laws, institutions to which compulsory education of the narcotic victim may be applied, just as compulsory education is demanded for the general training and culture of the normal child, and this without any discredit or unfavorable reflection, but on the contrary with individual and public approval, encouragement and endorsement. To remove the cause of disease is a *sine qua non* for successful treatment, and as it is only too well known that a large proportion of our young men and women are weak and prone to indulge in drink, is it not a public duty either to exterminate the café and 'ladies entrance' respectively of our leading hotels and saloons, or so regulate this phase of their nefarious business as to protect these hereditarily weak and acquired selfish types of man from becoming victimized by so convenient and accessible a means to an end?

## ALCOHOLISM AND FEEBLE-MINDEDNESS.

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By HENRY H. GODDARD, of Vineland, N. J.,Director, Department of Research, The Training School, Vineland, N. J.

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Huxley once remarked, "You cannot down an evil by telling lies about it." Perhaps no evil has been so persistently assailed by this method as alcoholism. Perhaps "lies" is too strong a word, since the enemies of alcoholism were not consciously telling falsehoods, but convinced as they have been that alcohol is one of the worst enemies of the human race, they have easily accepted, and assiduously passed on, many unfounded statements. Many of these statements have been allowed to stand because no one was able either to prove or disprove them. The scientist who knew that they could not be proved could not disprove them because the actual facts of the situation had not yet been determined. One such statement long current, and found in highly reputable books, is that alcohol in the parent causes feeble-mindedness in the children. It is, perhaps, not premature to examine this statement in the light of the present day accepted facts. First, let us see upon what the statement is really founded. An examination of the literature shows at once that there is little or no evidence to support the statement. The conclusions that have been drawn are the result of bad logic. The fallacy is usually so manifest that the only surprising thing is that any one could have reasoned so falsely. The argument usually reads something like this: "The children of a certain institution for the feeble-minded have been examined, and it has been determined that a certain percentage of their parents were addicted to alcohol." In one case it has been stated as high as 80 per cent., which is not at all impossible. From this the conclusion is drawn that the cause of feeble-mindedness in 80 per cent. of the cases is found in the alcoholism of the parents. This is like the argument so persistently urged a few years ago that because it rained sometimes on the Fourth of July therefore the cannonading is responsible for it, and if we would make it rain it is only necessary to explode balloons in the air and the desired results will follow.

No attempt was made, in any of these cases of supposed alcoholism as a cause of feeble-mindedness, to discover whether there were any other possible causes that ought to be eliminated. Until such investigation is made any conclusion that is drawn is of course highly fallacious.

Another method of reasoning which has satisfied many has been one form of the *a priori* argument. We know that alcohol is a powerful drug. What is more likely than that if the father was a hard drinker the alcohol would permeate his entire system, reaching the germ cells, more or less devitalizing them, and rendering it impossible for them to contribute their full share of energy to the offspring. Or still more plausible, in case the drunkenness is in the mother, that the ova would be affected so that they would be unable to develop in the normal way, and we might reasonably, therefore, expect a mentally defective child to result. Of course, such an argument is utterly worthless until there are some facts to support it. Within a month or two there have appeared some published results of an experiment which seems to give strong color to this argument. Stockard, of the Cornell Medical School, has been experimenting for five years on guinea-pigs. He began by subjecting certain pairs of guinea-pigs to the fumes of alcohol, thereby keeping them drunk most of their lives. The offspring from these guinea-pigs were carefully studied, being reared away from the alcoholic fumes. Stockard is now able to report the results as found in the fourth generation. The reader will find these experiments described in the *American Naturalist* for February and March of this year. Stockard says: "Finally, then, the experiments show the hereditary transmission through several generations of conditions resulting from an artificially induced change in the germ cells of one generation." The resulting conditions referred to are largely physical deformity, so great in many cases as to result in death either before birth or soon after.

The experiments are of extreme importance for the whole problem of heredity and the transmission of acquired conditions. But in the interest of truth the tendency that one may have to draw conclusions as to the offspring of alcoholized human beings must be carefully restricted. In the first place, it must be remembered that we have no way to measure the relative strength of the injury. There may be all the difference in the world between subjecting a guinea-pig to an atmosphere of alcoholic fumes and subjecting a man to the most frequent doses of beverages containing a high percentage of alcohol. Secondly, it must be remembered that it is unsafe to draw conclusions of the effect of a drug upon man from its known effect upon the lower animals. And lastly, it must be remembered that Stockard's results were largely in the form of physical deformities. While he cites one case in which the brain appeared quite different in some respects from a normal brain, nothing is definitely shown as to the effect of this upon the mentality of the guinea-pig, or the frequency of this kind of deformity.

So far, then, the matter seems to stand about where it has been. Let us now turn to some results which, while also negative in char-



acter, yet have a certain positive value in that they result from the rather extensive mass of data which ought to have shown the positive effect of alcohol in producing feeble-mindedness, if such effect existed. In connection with our study of the 300 cases at Vineland which has already been published under the title of "Feeble-Mindedness—Its Causes and Consequences," we have accumulated many facts on the subject of the alcoholic or non-alcoholic condition of the parents of the children in the Vineland School. As is known to most of the readers of this article, an investigation was carried on, through the agency of our field workers, of the ancestry of these children as far back as it was possible to go, actually ranging from two to seven generations.

The 300 children whose families were investigated had 11,389 relatives, or an average of a little less than 40 to each family. This means that on an average we were able to chart for each family represented by a child in this School 40 people including the parents, grandparents, cousins, uncles, aunts, etc. Of course, concerning many of these we know nothing except that such persons existed. Of the 11,389 persons 365 were alcoholic, that is 3.2 per cent. Alcoholic here means drunkard. We were unable to draw any other line than that. The first fact to be noted is that out of these 300 families, averaging as was said something less than 40 to the family, 160 families showed no alcoholism in the parents of the child in the Institution, while 80 families showed alcoholism in the parents. Sixty more showed alcohol, but also showed paralysis, epilepsy, insanity or syphilis. Of the families of the 80 children whose parents were alcoholic, in not a single case was it possible to demonstrate that the alcohol of the parents was the cause of the feeble-mindedness of the child. In 57 out of the 80 cases the families were those in which the condition of feeble-mindedness was strongly hereditary. In 7 more it was probably hereditary. In still another 7 there were serious neuropathic conditions. In the remaining 9 the condition was apparently due to injury. In other words, we have here an illustration of the point raised in the first part of this paper—namely, though the parents are alcoholic, what do we know about other possible conditions existing? The answer is, that of the 80 families where the parents were alcoholic, in not one could we eliminate the possibility of other causes. So far our only conclusion from this phase of the study is that we find no evidence that the alcohol in the parents is the cause of the feeble-mindedness of the child.

There is, however, another way of counting up the results which does seem to show that alcohol may have some influence. Counting now, not simply the parents of the *children in the Institution*, but every mating found among these families, and dividing them into two groups: the cases where either the father or mother or

both were alcoholic, and the cases where neither was alcoholic, we have 240 matings in the former and 1,606 matings in the latter group. The *alcoholic* parents had 1,316 children, the non-alcoholics 6,604. That is the alcoholic average 5.5 children to a mating, while the non-alcoholic average 4.1. If now we count up the children of these two groups we find that of all the children of the *alcoholic* parents, 31 per cent. were feeble-minded, while of the children of the non-alcoholic parents, only 18 per cent. were feeble-minded. We also note that of the alcoholic group 17.6 per cent. died in infancy as against 8.5 per cent. in the other group. Likewise 8 per cent. of the conceptions in the *alcoholic* families resulted in miscarriages; of the *non-alcoholics* only 3.5 per cent. It would appear from this that the alcohol was at least a contributing factor, and yet even this may not be the case since it is still possible that there is a disturbing factor, in that the *alcoholic parents* may be those who were naturally weaker mentally and consequently produced more mentally defective children. One fact which space forbids me to discuss, but which our study brought out very clearly, is that even if feeble-mindedness is not due to alcoholism, on the other hand alcoholism is to a very large extent due to feeble-mindedness.

In conclusion we may say that while our results are mostly negative and we can simply say that we have failed to show that alcoholism of the parents causes feeble-mindedness in the children, the results could be made positive if it was safe to argue that were there a causal relation between these two things, it ought to be discovered in a mass of data such as that which we have considered. To what extent that is true depends, of course, largely upon the character of the data themselves.

My own feeling is that feeble-mindedness is pretty well accounted for by heredity, neuropathic ancestry and accidents (including diseases in the child and in the mother); with the possibility that given these conditions the addition of alcohol may in some cases throw the case into the feeble-minded group where without the alcohol it would have escaped.

If there is strong and incontrovertible evidence that alcohol in the parents is a cause of feeble-mindedness in the children, it should be presented. But to be conclusive it must be logical and all other possible causes eliminated. This is no easy task.

## THE DRUG TRAFFIC AND ITS VICTIMS.

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By BURDETTE G. LEWIS, of New York,  
Commissioner of Correction of the City of New York.

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## I.

## DRUG ADDICTS HELP SHOW THERE IS NO CRIMINAL CLASS.

In a sense, the drug addict does not suffer in vain. He comes into court and into the hospital from every rank of society. His presence, surrounded by his friends, upsets the smooth-running routine of the courts, the cut-and-dried and time-worn formalism of the penal law and the man-herding system of individual neglect which characterized the reception and treatment of inmates under the old prison administration and discipline. All agencies of government, even public opinion itself, can accept with more or less indifference the outworn philosophy of a criminal class as long as attention is centered upon the little known 'underworld,' but it is different when fathers, mothers, sisters, brothers, doctors, nurses, lawyers and even bankers are brought out into the open as violators of the laws governing personal habits.

Physicians are familiar with the age-long warfare of science upon the crass ignorance and the mean superstition which held that a sick person was a person possessed of a demon. They can more easily sympathize, therefore, with the idea that the offender is likewise not a man possessed of a demon, but is a sick man who needs training and treatment at the hands of firm, well poised, scientifically trained and experienced leaders of men in the various fields of human endeavor. The prison and reformatory physician particularly has little sympathy with the ideas expressed by a former leading officer of our own City Reformatory to the effect that inmate F——, a psychopathic borderline insanity case, "is a little devil. Under our former management here we would take him down stairs into the basement and beat the devil out of him and then he would be a good boy after that." The modern tendency is to record each case as individual and peculiar, and rebels against classification in advance of study and examination in each particular case. The drug addict is a particularly striking example of the necessity for such treatment in any institution or hospital to which he may be committed.



## II.

## THE RESULTS OF TREATMENT OF DRUG ADDICTS HAVE BEEN GOOD.

It is most difficult to secure reliable data upon which to base any discussion of the results of drug treatment, for the reason that extensive treatments have been given in institutions for so short a time. Apparently some 380 treatments given in the New York workhouse to as many individuals have been, for the most part, successful. Likewise, treatments given in The Tombs have, in a large number of cases, been successful. The same can be said of each institution of the New York Correction Department. Prisoners themselves state that the method of handling the addict worked out by Doctor Ernest S. Bishop, in consultation with Doctor Pettey, of Memphis, Tennessee, is practically painless and produces the best results. As a result of this information conveyed through the channels best known to the addicts we have from two to six requests per week from addicts to be committed to the Workhouse, Blackwell's Island, in order to secure this treatment, as it is impossible to secure it in the Charity and other hospitals. In these cases they are given a note to the Chief City Magistrate, Mr. William McAdoo, and a pass allowing them to visit the warden of the workhouse, Mr. Frank W. Fox. They visit the office of the Chief City Magistrate who makes out a commitment and hands it to them. Then they take the commitment and the pass and actually commit themselves to the Workhouse where, upon arrival, the warden turns them over to the medical officers of the institution for treatment. In this way they avoid the unpleasantness of the prison van conveyance, where they would be brought in contact with regular prisoners.

Mr. Charles B. Towns set aside one ward of his hospital for the use of the Commissioner of Correction wherein persons might be admitted upon request of the Commissioner of Correction when they had no funds to pay for treatment. Several persons have thus been sent and many persons have thus been apparently cured. One young man in the service of the City of New York was thus given treatment and has been doing his work faithfully during the last six months.

The Social Service Bureau of Bellevue Hospital made a field study of drug users committed to Bellevue between August 1st, 1915, and January 1st, 1916. In all, 202 cases were investigated. Their report shows that some of these addicts acquired the habit through illness. They say: "The larger proportion, however, acquired the habit through distributors on the street, both men and women, who made a regular business of offering the drug free at first in order to add to their clientele. They keep informed of the whereabouts of their customers; they even keep track of the probable time a new supply will be needed and pursue the users to their homes. Some

make the rounds of the homes at regular intervals to give the drug hyperdermically. Some of our patients have been tempted even on the way from the hospital to their homes."

The investigation showed further that the chief industrial effect of the use of drugs was that the users lose their jobs through arriving late in the morning, not because they do inferior work. When discharged for late arrival they seem to lose their ambition and sink to the level of the gang distributors, working out a miserable existence. Investigators in the follow-up service have visited every home and talked with every addict. Their recommendations are that after the hospital treatment is given, farm colonies and the like should be provided where those treated in the hospital may be held for convalescence and rehabilitation. They recommend particularly that those discharged from the hospitals be sent to Warwick Farm, a large farm of 750 acres, for which the City of New York has just appropriated \$100,000 to build permanent structures for the treatment of drug addicts.

One main result is noticeable in all our institutions—namely, that there are fewer persons being committed in serious mental and physical conditions than there were a year ago. As the physicians and institutional employes become more experienced in this field, there is no doubt that the result of the treatment will continually improve.

### III.

#### RESTRICTIVE LEGISLATION HAS BEEN HELPFUL.

Many physicians, dentists and druggists complain of restrictive legislation, and while it is no doubt true that they are burdened by restrictions, nevertheless, any one calmly surveying the field, it seems to me, should come to the conclusion that the social results of restricted legislation have on the whole been good.

In the City of New York the Police Commissioner and the District Attorneys became active about January 1st, 1914, when the present administration took office. The present Police Commissioner organized a special squad attached to the Headquarters of the Department, to be known as the Narcotic Squad. As a result of this work and renewed activities of the police generally, some 2,000 arrests were made of users and sellers, for the most part users, in each of the years 1914 and 1915. Sixteen officers of the Department of Correction and three officers of the Department of Charities were arrested and convicted as traffickers in drugs. Among these were a Resident Physician and one male nurse of the Workhouse, Blackwell's Island. The arrests have greatly aided in the campaign against gangsters in the city, as it is a well-known fact that gangsters use drugs in order to nerve them for their murderous work. The activity of the Courts, Dis-

trict Attorneys and the Police has called public attention to the necessity for furnishing treatment in these cases and for modifications in the law permitting a more careful handling of the cases. The result has been that in this State a law was passed which permits the court in any stage of a proceeding to stay court action in any case, no matter in what action arrests were made, and to commit the person in custody to any institution for treatment where he shall be held until the Resident Physician therein shall certify that he is cured. Then the person is brought back into court for such action as is deemed desirable under the law. If he has not yet been indicted, he may then, after having been treated, be indicted, tried, convicted and sentenced for the crime with which he is charged. If he were committed to the institution for treatment for the drug habit after conviction, he may be given a suspended sentence and placed on probation on the principle that the use of the drug was the real cause of the crime. Or, he may be committed to prison for any period of time, the Judge to determine as far as he has discretion in the matter.

In other words, the law provides an absolute indeterminate sentence for drug users, no matter whether the use of the drug is the basis of the arrest or whether an assault or a robbery is the basis of the arrest. This wise and humane law is working a great change in the administration of the law in the criminal courts in this city, and will continue to do so, as it is not yet utilized to the fullest by the various courts.

The City of New York was benefited substantially by the passage of the Harrison Act by Congress, as Connecticut, Pennsylvania, Massachusetts and New Jersey were made the base of operations for traffic in the city after the stringent Boylan Act was passed in the State of New York. As the Harrison Act is a revenue producing measure, it is possible to secure convictions of persons from other states who traffic in drugs within the City of New York.

Some complain because drug addicts are held under provisions of the criminal law. There may be some injustice in this as in all other social welfare matters, but anyone who knows the drug traffic victims knows that any user is a potential seller, because there are very few users who have incomes large enough to permit their purchasing the drugs in large enough quantities to satisfy their craving for these drugs. Hence, continued use means selling or stealing, in order to secure funds enough with which to purchase an adequate supply of these drugs.

It is, however, a mistake to assume that all drug users are sure to become degenerate and immoral in every respect. Many of them are the finest people we have, and while they become sick because they are really afflicted with the drug addiction disease, they do not become degenerate and dissolute persons because of their use of the drugs.



## ALCOHOL AND NARCOTICS.

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By ROBERT T. MORRIS, M. D., of New York,  
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Alcohol is an excretion from a fungus. It is a rule in organic life that any excretion from any organism is a poison to any other organism, or to itself. Excretory matter may be metabolized in various degrees by the cells of different structures, but the liver assumes the greatest responsibility and is the chief sewage disposal plant for managing toxic material of any sort which is going the rounds of the circulation. A man who happens to be sending an abnormal number of toxins to his liver because of a defective chromaffin system, is commonly enough the very one who places an alcoholic burden upon the automatic machinery of his liver. The latter organ is sometimes obliged to become hypertrophic in a good-natured attempt at keeping upon sociable terms with the other organs. Such a liver, finally tiring of too much work, allows its hyperplastic connective-tissue to contract and to squeeze out more or less of the parenchyma of the organ.

Narcotics may be classed roughly with alcohol and with body toxins in the sense that they and their by-products must be disposed of during over-time work on the part of the liver and other organs.

Why do men impose such extra work upon their machinery? I believe it to be due for the most part to their uncomfortable cenesthesia. Why should men have uncomfortable cenesthesia? I believe it to depend largely upon the sensitizing agents which are sent out by inefficient ductless glands, under the conditions of civilized life. All organic processes are conducted under the stimulus of sensitizing agents, but when these agents are formed in excess of the powers of metabolism, or when they are ingested, in addition to inherent sensitizing agents, the tissues of the individual, including his brain cells, may become so uncomfortable that he tries to get away from himself. People with uncomfortable cenesthesia get away from themselves temporarily through the aid of alcohol and narcotics (including tea and coffee) but they commonly fail to count the cost.

A dog in his faithfulness often follows his master's habits in civilized life, and suffers from similar errors of metabolism. A city dog led by a string stands as an object lesson. His master, led by a string which we call ambition, falls into neglect of the kind of

exercise which would allow both him and his dog to remain strong and well. There is deficient oxidation of waste products in the man's body economy. His comfort goes wrong and he employs artificial means for correcting what was brought about by artificial habits in life.

Man as a gregarious species has a marked tendency to collect in flocks in towns and cities. He then fails to engage in that degree of exercise which belongs to a fine animal. The good animal condition was recognized by Aristotle and by Emerson as a prerequisite for the good man.

Now for the second part of our argument. When men fail to oxidize waste products, some of these products appear to bring about a condition of allergy in the individual; in other words, we have the phenomena belonging to over-sensitized cell protoplasm. Tissues which are allergic not only fail to carry on processes of reconstruction normally, but they lose part of their defense mechanism. The molecules of tissue cells take in and cast out atomic groups not belonging to their normal function, and a depraved body chemistry results. In an effort to relieve cell discomfort due to bad body chemistry, men add more chemistry, the cumulative effect of which is more or less injurious.

The third part of our argument relates to that kind of selective affinity for toxins which belongs to different organs, and notably to the reproductive organs. Experiments with animals have proved clearly that the organs of the sex group show a markedly injurious selective affinity for alcohol and its by-products. They likewise exert harmful selective affinity for various toxins, particularly those which emanate from some of the focal infections. This appears to mean that nature wishes to dispose of a poisoned individual, and to stand in the way of his having progeny which might develop from the cells of a defective parent. Nature in this way adopts measures for eliminating the poisoned individual and his progeny from the group of normal mean-type individuals which she chooses to preserve.

As a purely academic statement, alcohol, caffeine, opium derivatives and many other drugs are regularly poisonous to man. Let us stop now for a moment and ask if there is a compromise position.

Assuming that man will continue to follow the urge of his gregarious instinct, we postulate that he will continue to allow himself to become sensitized to various chemical influences from beverages, from microbe toxins, and from his own waste products. We assume that a disturbed cenesthesia will follow as a logical result, and that his disturbed cenesthesia will call for a certain degree of relief. This relief wisely conducted may allow a man to remain a better citizen than he otherwise would be.

A man who boasts that he has never touched alcohol or tobacco will sometimes oblige acquaintances to bring up the question of the validity of his success. He may remain in such a state of nervous tension and so irritable for lack of beverage relaxation, that he keeps everybody about him in a state of unrest.

A glass of good wine is the triumph of vegetarianism. A glass of good beer gives cheer and comfort without notable injurious effect, provided that it is properly employed. It leads to a certain freedom of expression of those kindlier emotional faculties which go with nice, easy sociability. Furthermore, a glass of hot whiskey taken at the beginning of a chill from a common cold is so practical in its pragmatic results that arguments of the prohibitionists fall down in confusion before the standing object lesson.

If we assume that alcohol is always injurious, and that under conditions of civilization unmetabolized products of the individual are also injurious, there seems to be a way for steering between Scylla and Charybdis with the aid of the right sort of alcoholic beverage, at times.

Concerning tobacco. A man with disturbed cenesthesia who increases his tissue irritability by the strain of daily work may become better company for his wife in the evening at home if he enjoys a comforting pipe when reading the newspaper. Furthermore, tobacco leads to that quiet contemplation which has been held to be desirable by many classic philosophers. Incidentally, we may remark upon the statement that "a man looks so comfortable when he is smoking a pipe." The reason for that is because an uncomfortable man cannot smoke a pipe successfully. A high strung, nervous puffer pulls the fire down through the middle of the tobacco, and disagreeable tars and other products of combustion then become condensed upon the unburned tobacco about the periphery of the pipe. Tobacco when used moderately by a man who really needs it for relaxing the banjo strings, appears to be beneficial, to his acquaintances, at least. Tobacco employed improperly exerts a poisonous influence which has to be paid for.

Tea and coffee when used in moderation, to the extent of calming that disturbed cenesthesia which would make people bad company, appear to be useful beverages. Not so much is to be said for any of the other 'drugs' as they are commonly employed under conditions of life in America. We cannot speak for China. Human experience has chosen for polite employment only those alcoholic or narcotic beverages, which appear to overcome certain effects of vicious body chemistry belonging to our habits of life, and these beverages are to be used in moderation if they are to be helpful. Experience has proved that most of the other drugs are very harmful, excepting when they are employed directly for medicinal purposes on special occasions. At this point some one will look up



and ask why it is that savage people and strong men engaged in outdoor work, lumbermen, for example, have such a fondness for alcohol, tobacco, tea and coffee, if the demand for these 'drugs' depends upon a disturbed cenesthesia. That introduces another question altogether; the question of fondness for varied experience. Savages and woodsmen who are engaged in healthful outdoor exercise and not disturbed by morbid cenesthesia, appear to enjoy the kind of experience which goes with a second personality: two men in one. The man who said that the drink which he had just taken made him feel like a new man, and the new man now wanting a drink, represents an extension into a third personality and a dangerous liberty. The second personality resulting from liberation of emotions which are commonly held in check, allows a sort of vacation from the strenuous psychology employed by most people for keeping themselves in good standing with their fellows. This commendable repressive influence results in forming one sort of character, the really safest and best character when judged from a standpoint of conventional standards. The Indian and the woodsman enjoy the effects of alcohol and tobacco particularly because they liberate a part of the personality which is kept in check by the conventions.

Sometimes we read that reporters have unearthed a man one hundred and two years of age who ascribes his longevity to the fact that he has never tasted alcohol, tobacco or coffee, and has always voted the Republican ticket. The news produces a more or less profound effect within the range of that particular newspaper, until some cynical reporter goes to another town and hunts up a man one hundred and three years of age who ascribes his longevity and ability to read without glasses to the fact that he has chewed tobacco and drunk whiskey ever since his marriage. This other news item impresses another circle of readers, because we folk are all great hands at coming to conclusions.

When considering the question of alcohol and narcotics broadly as a whole, we must take into consideration all these various factors in the problem. The two main questions appear to be those of relief of painful cenesthesia, and the enjoyment of a second personality. Tea and coffee belong with alcohol and narcotics in this grouping, but they are milder in direct influence and in back action; consequently tea and coffee do not commonly fall under the ban when good people seek to legislate against a more apparent and more serious evil, that of employment of alcohol, and of the drugs which colloquially go by the name of 'drugs.'

We assume that legislation must take charge of that part of the question which relates to the inability of crippled individuals to protect themselves against themselves. The right line for managing the question is by way of the principles of pedagogy. The newer

pedagogy when applied to the alcohol and drug question will explain to people the reason for their desire for second personality agents. It will explain to people the physiology involved in the question, and will belong to the department of preventive medicine of tomorrow. The public is not as yet quite ready for this sort of teaching.

If all questions were to be settled at the present time, nothing would be left for the teachers and philosophers who are to be here two thousand years from the present day, and who would be obliged to mope around with little to do.

If the public is not yet ready to receive the teachings of a pedagogy not yet formulated, relating to alcohol and the narcotics, certain expediency measures are really required by way of legislation in the meantime. This legislation must be more or less arrogant in relation to alcohol and the so-called narcotic drugs. In our country there is always a tendency to make legislation cure all ills, but we cannot depend upon legislators for correcting bad physiology. They sometimes have it themselves. The newer pedagogy is to take up the question of man under conditions of civilization. It will then appeal to his intellectual set of faculties, and we shall make better progress than has been made by the arbitrary ruling of legislatures or the emotional appeals of people who have the right idea in general, but who do not know what they are talking about.

If one will step into the public library and call for a recently published book entitled "Microbes and Men," he will find an essay on the subject of alcohol. The statement is there made that "alcohol does about everything that its friends claim for it and about everything that its enemies claim for it," because of the nature of reciprocal actions which are set up by the liberation of energy of this substance in the liver. By way of the index, one will find also a more elaborate description of the fundamentals of the drug question than can be given in this brief contribution.

Literature relating to the subject of prohibition has been read chiefly and most eagerly by people who are already prohibitionists. Other folk when reading this literature seem to get a sort of feeling that something has been left out; that the advocates of prohibition are not fully frank and judicial;—consequently prohibition literature does not catch hold of the public with hooks.

## THE PATHOGENESIS OF ALCOHOLISM AND NARCOTISM AND THE TREATMENT OF THEIR CAUSES.

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The conditions that make inebriates are of many kinds, for inebriety is not a disease itself, but merely a habit of psychic reaction. However, in whatever way it originates, it eventually becomes a craving. Craving is a sign of physiological need, and can be analyzed into a sensation and a tendency. The reaction to a definite objective produced in human beings is the result of preceding impressions constituting memories. These reactions are infinite in variety, depending upon the experience of the individual, conjoined with his constitution.

Before discussing them let us consider the matter of craving. It is a physiological discomfort. In healthy persons its goal is simple, and is dictated by the body-need it expresses; for instance, drink, food, movement, rest, sleep, warmth, coolness, sex relations, cleanliness, urination, defecation, sneezing, coughing, professional and social activities, creative work, etc. Each of these acts relieves a state of tension or discomfort; the gratification abolishes the craving until physiological conditions again demand satisfaction.

To these healthy impulses must be added a great many perverted desires. The source of these must also be sought in a condition of uncomfortable tension of the body, expressing itself as a feeling of discontent. There is no fundamental distinction between the very complex condition of psychic discontent and the simple tropism of a lowly organism, known as negative chemotaxis. We speak of the former as psychological because it resides in a vastly complicated series of inter-reactions of highly specialized tissue, the dispositions of which are integrated by former stimuli, the bases of memory; but it is strictly physical, although its material essence is not differentiable. Reduced to its simple terms, it is merely a reaction to stimuli from outside. But the stimulus of altered body secretions is also external to the tissue cells of the nervous system of which the reaction is affected.

Metabolic poisoning is a fertile source of the tissue discomfort which seeks a nepenthe, whether in alcohol, or such solutions as morphine, tobacco or the caffeine alkaloids.

As the effects of these are well known, I will not here enlarge upon them as conducive to intemperance. But of another source of meta-



bolic disturbance, knowledge is not so widespread. I refer to excessive consumption of proteins and animal extractives. This induces a disturbance of metabolism which expresses itself (1) in general irritability; (2) in increased blood-pressure and fibrosis of the tissues, and (3) in general deterioration of the organs after which restoration and complete health is impossible. A case of the kind is appended to illustrate its management:—

An engineer, *æt.* thirty-eight, referred by Dr. Atkinson, a powerful, energetic man, formerly accustomed to active work, had been unable for months to concentrate upon the office work to which he had confined himself for over three months. Previous to this he had been much less active, and latterly he had been very much worried by an official inquiry into a contract for which he had been mainly responsible. For no cause known to him he feels a dread in the mornings, and an indecision in business matters is now realized to have been present several months. There was no syphilis or any other organic disease, and he took no alcohol.

He had been improved by three weeks in the woods, during which he was very somnolent, but relapsed at once upon return, and could hardly stand his morning suffering. There was no insomnia.

*Physical Examination.*—The reflexes were rather active, but there was no other objective change in the lower neurons; there was no amnesia; the sexual hygiene was normal. He was much depressed and longed to go away from it all for a year, which he could well afford to do.

*Treatment.*—He was sent for three weeks into the mountains. This time he fully recovered, on account of the proper diet which he took. Breakfast and supper were of milk and fruit, and his midday dinner was vegetables and six ounces of meat; after a few days cereals were added morning and night.\*

To get rid of this, the victim at first does not know what to do. He may try in turn each of the available physiological gratifications, work, eating, moving about, change of scene, sexual excitement. If these do not satisfy, he may then resort to some artificial excitant. If a physician is consulted, he may receive strychnine, bromides, phosphates, caffeine, etc. If his associations are suitable, tea, coffee, or tobacco may be encountered; otherwise he may find his recourse in gambling, card-playing, or other 'sporty' recreations. In communities where conviviality is frequent, persons with slight degrees of morbid general sensations will find them much relieved by the alcohol so easily available.

*Type I. The Psychasthenic.*—But bodily or mental discomforts are sometimes met in a quite unsensual way as a result of antisensual habits engendered by the upbringing. These persons react to their ill-understood body-cravings by what are called psychological derivations. As to no problem, however small, can they find a satisfying conclusion; they rest in a discomforting indecision, the doubting mania. As they have not a sensation of emotional tranquility, they are beset by frequent fears, the phobias as they are called: fear of a

\*Williams: Hypertension Nervousness. (*Month. Cyclop.*, 1911; *Lancet-Clinic*, and *West Virginia Med. Jour.*, 1915.)

wide place, fear of a close place, fear of contamination, fear of heights, etc. As they are in bodily discomfort, they try by attaining a new position to reach a comfortable feeling; and failing to do so, they repeat a movement until it becomes a habit, a tic, as it is called; or they may indulge in ambulations, like the tramp or the Wandering Jew.

Persons with these tendencies are known as psychasthenics. They suffer from a sense of incompleteness, which gives rise to extra scrupulousness about what they feel, think, or do. They are burdened by a 'New England conscience.' Unless carried out of their conscientiousness, their existence is unhappy. To gain relief from this, some of them take to alcohol or narcotics. While under the influence of these their conscience is in abeyance; they realize what Burns said:—

Kings may be blessed; but Tam was glorious,  
O'er all the ills of life victorious.

The significance of this kind of inebriety is that such individuals should be properly restituted to psychological health. The cause of their condition is a maladjustment of the personal or social attitude towards life, which is usually originated quite early, even in childhood.

When inebriety has added itself to the original psychasthenia, the condition is more complicated than will afford a clear illustration of its mechanism; and as it is in childhood that the condition is most simple, the illustration here given to show the proper method of management of such individuals is that of a child.

The person performing this office might well be called an adjuster; for what is effected is an adjustment to the environment. The process is actually known as 'rational psychotherapy,' in\* contrast to 'suggestive therapeutics,' which proves so unavailing in these cases, and in contrast to the obsolescent 'psychoanalytic therapeutics,' which caused so much stir among certain neurologists quite recently.\*\*

#### PSYCHASTHENIA NIPPED IN THE BUD.

A little girl, *æt.* ten, the daughter of a clergyman, was seen by me four years ago. One day she would be well and the next crying, feeling miserable, tired and dizzy, with a dull headache as a result of lying in bed thinking. The preceding summer at school she had been irritable, cross, impatient, and quarrelsome with her sister. She had formerly been easy to manage and full of life and joy. Her mother was most anxious, and took pains to avoid startling or fatiguing her, and in the belief that it exhausted the child, forbade the impulsive squeezing and kissing which the child frequently desired. She had noticed that the little girl was less impulsive and irritable when having

\*Williams: Spurious and Genuine Treatment of Psychoses. (*Ill. Med. Jour.*, October, 1914.)

\*\*Williams: Treatment of Psychoneurotic Patients. (*Cleveland Med. Jour.*, 1915.)

something to do. Nevertheless, misguided, she took her from school and this, of course, aggravated her nervousness.

*Physical examination* was negative, with the exception of a slight hyperopic astigmatism, and a variable visual acuity without apparent cause was found by Dr. F. N. Chisholm, who referred her to me.

*Psychically*, intelligence was normal. She was timid, hyperconscientious, and much concerned for having been reproved for impulsive shouting, for violent hugging of her parents, and because of some eau de cologne she used. This had really been taken by a little sister, who was punished for it. She was sometimes so unhappy and miserable that she did not want other children near her, and she was most unhappy because she was not allowed to show her affection for her father and mother, of whom she was very fond, more especially of the latter. Her dreams are rare, but she recollected one of a white-bearded man who dragged her from the bed by her hair and another of a wild animal trying to eat her. I could not at the time obtain any associations from either of these, and, indeed, I was more concerned relieving without delay the intensity of the repressions which made the child's life a burden.

One physical factor complicated the case, the child eating excessively of meats and oatmeal, and making her principal meal at night. I believe this was the initial cause of the irritability of temper and the impulsiveness which led the overconscientious parents to repress overmuch. The little girl's syndrome was far from a fully developed psychasthenia; but the case shows beautifully how that disorder may commence and be fostered by injudicious management.

*Treatment.*—Midday dinner was prescribed, and a supper mainly of carbohydrates and fruit, after which she should not go to bed for at least an hour. On waking in the morning the child was instructed to make a practice of getting up and going outside instead of ruminating in bed. The parents were told to avoid nagging her about trifles, and her behavior was to be left to take care of itself at present. Her affections were to be indulged too. As a result, 'nervousness' ceased and the child returned to school in two weeks, and she has remained well and happy ever since.

#### A MORE ADVANCED CASE.

A boy, *æ*t. thirteen, was referred by Dr. Guy Latimer, of Hyattsville, Md., because of extreme timidity, many 'nervous' tricks, and an inability to concentrate his attention. The most conspicuous symptoms were an arithmomania, a mania for verification, including a *désir de toucher* and a *manie du sort*, one of the forms of which was the imperative need lying on his back on the floor at frequent intervals while dressing in the morning. These various mannerisms intermitted and replaced one another.

*Mechanism.*—Analysis revealed that all were in reality expiatory penances for a jealousy for his little brother, which had already begun at the age of three, when he had asked that the baby be thrown from the window, and once banged his head on the floor while enraged. He himself had always been much petted, and he craved for it. It was the reproof of an aunt which first created the shame for his jealousy and led him to make penance in this fashion. Latterly he had been urged to cease his peculiarities, and can stop any of them when on the alert by a hard struggle. His distress at doing so, moreover, soon passes away. But his frequent absence of mind in day dreams, which he loves, interfered with his endeavors. This tendency was favored by his not having been allowed to play the games, of which he is fond, with the boys in the neighborhood, which is rather a rough one.

This desire for expiation began when he was between three and four years, by thinking it was mean not to give his toys away; so he gave them



all to his brother. He was told it was naughty to be jealous, and he felt ashamed, but did not cry, but just sank into himself and said nothing. He still reproached himself. If his mother did not pet him for a week he thought she did not care for him, and so he would be unhappy. He does not know the reason why he is jealous of his brother, for he loves him, and they do not quarrel much, even when the other cheats at play. It is in the morning and at night that he is most beset by his manias, and he feels things would go wrong for the night or day if he did not perform them. He declares, "I always seem to want to do something I do not want to, because I do not want to." He does not know why. He has no shame of body or sex, as he has been fully instructed. He is very religious, believing in heaven and hell, that he must be good, and feels that he ought to make himself sad because he does not like to be sad; but he is so prone to sadness that even as a baby, music made him cry. So conscientious is he that he undertakes every task with too great violence, quickly becomes exhausted, and then has to fight against the dreamy tendency which supervenes.

*Treatment.*—Having explained the genesis of his desire for penance, we decided to concentrate attention upon only one of his manias at a time, in order to break one by one the habits he had formed, and he was to take up carpentry work in order to combat the tendency to day dreaming. His diet was also rectified.

More and more control was soon obtained. On last hearing from him, he had taken a position, and had overcome his disabilities.

*Type II. The Hysteric.*—Not all inebriates become so because of craving or because psychasthenic. Many do so because of an easily influenced character. This may be due either to mere thoughtlessness or to weakness of the will, that is an inability to resist suggestions of others. This character is of the type which tends towards medical hysteria,\* that is to say, subject to the disorders induced by suggestion. Like psychasthenic manifestations, those of hysteria usually have their foundation in tendencies which originated in childhood. These may be purely due to a lack of training in inhibition. In many families, communities or social strata this is lacking. Indifference to the up-bringing of the child is sure to produce this tendency unless it is corrected by the collisions which experience brings. In some instances, it is possible that impulsiveness with failure of inhibition is temperamental and inborn; but even in these cases it is held in abeyance by an environment where inhibition is the fashion. This is well illustrated by the habits of the people of Scotland and those of New England in former days.

To illustrate in the most simple way possible the mechanism of hysteria, I subjoin the case of a child, and describe the method of re-education which accomplished his cure.\*\*

\*Nature of Hysteria. (International Clinics, 1908, Vol. III; *Boston Med. and Surg. Jour.*, 1909, March; *Amer. Jour. Med. Sc.*, 1910.)

Traumatic Neuroses and Hysteria. (*Amer. Jour. Med. Sc.*, 1915; *Med. Record*, 1909; *Jour. Abnorm. Psychol.*, 1910; *New York Med. Jour.*, 1909.)

\*\*See also Management of Exceptional Children. (*New York Med. Jour.*, June 8th, 1916.)

## PHOBIA OF WILD ANIMALS WITH IMPULSIONS TO FLIGHT.

A boy, *æ*t. eight, was seen with Dr. A. L. Tynes, at Staunton, Va., in the autumn of 1911. The preceding May he had developed what his parents called hallucinations, which occurred only when he was alone, for he would go errands and play about if he knew he was in sight of any one at all. There were no night terrors, although he feared going to bed alone, and his mother and father always accompanied him upstairs. Whenever he was alone, a spell would occur. The hallucinations were accompanied by a loud cry and a twisting backwards of the neck and contortion of the body, so that a distinguished professor regarded him as epileptic. He was very rarely still, wriggling about nearly all the time in an excitable fashion. His father and maternal uncle are declared to have had similar attacks in childhood. But it could not be ascertained that the parents had not spoken of some of these before the boy. The mother was over-anxious, hysterical, and very uneasy when the boy was out of her sight, of which the boy was well aware.

*Mechanism.*—Examination showed no physical signs of disease of the nervous or any other system. In anamnesis, I found him to be a very sensible little fellow and I ascertained that it was a snake which he usually saw, although sometimes a wild beast would be seen. His shout was really the name of the animal he saw. He could not describe the snake except to say that its head was like an eel. He remembered well the first such occasion of fright; and the creature was not then a snake, but a rooster. He declared that he was never actually afraid of any animals. Indeed, on one occasion, wearing a red sweater, he chased a bull into the cellar to look for the bogey man. He said that his only fear was that of being whipped by his father when he was naughty, and that of this he was "not very frightened."

I could not in the short time at my disposal penetrate the psychogenesis completely. My question, however, soon showed that the hallucinations were not true ones; for when I asked the boy, if when he looked around there was really an animal jumping on his shoulders, he had to reply "no"; and that he never actually saw, felt, or heard what he feared. He then spontaneously declared, "I reckon my imagination gets away with me."

*Diagnosis and Prognosis.*—Familiarity with the mechanism of terrors of children enables one to interpret this boy's case as a phobia against being alone, produced by the foolish anxiety of his mother. This affective state was an induced one, therefore, produced by the idea of some dreadful consequences which might occur to a little boy when not protected by his elders. But the morbid reaction had become a habit; so that even if the initial cause had been suppressed, training would be required to overcome the facile inductibility of the terrors. Inhibition of his undue impulsivity should also be undertaken.

*Treatment.*—Accordingly the following procedures were outlined and the reason for them clearly explained to the boy and to his father. Firstly, he must gradually accustom himself to go out alone: first for half a block, then for a whole block, and finally round the corner. While doing this he could hold himself in hand, his attention fully awake to the need of manly behavior and the importance of recovering from his timidity. Secondly, he must learn to go to sleep without any one else in the room, remembering what a nuisance is a boy who cannot forego keeping one of his parents constantly at home in the evening. Thirdly, he was shown exercises in slow movement and immobilization, by which he could suppress the wriggling tendencies of his limbs and body. His mother should be dealt with rationally too. As a result, no further attacks have occurred.

*Type III. The Vapid.*—I need do no more than mention the type of inebriate who becomes so insidiously through thoughtless participation in convivial customs, or who from vacuity of interests does so with his fellows as a form of amusement. It is against such persons, conspicuously presented by the colored people of the South, that prohibitive legislation is chiefly aimed.

Until, for those of these people who are not congenitally defective or diseased, there is provided not only adequate education in scientific morality but facilities for healthy recreation, it will not be possible to dispense with legal regulation of the freedom of recourse to alcoholic beverages of dipsomania.

*Dipsomania.*—Of the periodic drinker, by some regarded as a special type, I do not feel sure that this is the case; for although perhaps most of these unfortunate individuals are cyclothymic,\* yet some of them are merely psychasthenics in whom there is an occasional breakdown of the morale; so that there is a giving way to the temptation, which, though constant, is usually resisted.

Some periodic drinking is due to the culmination of the illness caused by an excessive and injudicious diet in sedentary men under mental stress. Alcohol is undoubtedly an antidote to the pressor toxins which these persons accumulate. Not only does the vascular dilatation produced by alcohol give relief from the effects of these, but the alcoholic toxicosis interferes with appetite and digestion. Hence the ensuing starvation gives the organism opportunity to adjust itself once more to a physiological metabolic balance.

*The Internal Secretions.*—That periodicity in over-indulgence in alcohol may be due to disordered internal secretions, evidence is accumulating; for the discomforts caused by endocrine disorders are just of the kind fitted to make their victim have recourse to any easily available modifier of cenesthesia.\*\*

*The Reproductive Apparatus in Relation to Intemperance.*—Of those glandular structures which influence the tissue tension on which depend comfort and discomfort, not the least important are those concerned with reproduction. It has long been known that aberrations of these interfere with the general health; and recent studies, more particularly those of Healy concerning kleptomaniacs, bring into full light the dependence of the psychasthenic impulsion, which leads to morbid thieving, upon repression of the normal func-

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\*This name is given to individuals in whom variations of mood are unusually great. The extremes of this condition constitute the manic-depressive psychoses. The chief characters of the two extremes are: on the one hand, retardation of thought and movement, and on the other, undue acceleration of the same, respectively. With regard to mood, the corresponding characters are despondency and exhilaration.

\*\*This name is given to the general sensations of the body as to comfort and need, as distinguished from the internal sensation of the position of the limbs and the state of contraction or relaxation of the muscles and from the external sensations derived from the periphery, such as those gained from the skin and special senses.



tioning of the reproductive apparatus. The nature of the impulsion which impels certain individuals to steal has been shown by this analysis of Healy not to differ from that which drives certain other individuals to drink. And the connection of this with a proper activation of the reproductive glands is similar in mechanism; and only awaits, for its demonstration and general acceptance, the subjection of a sufficient number of individual instances to observation and analysis adequate to reveal the true mechanism of their affection.

The alcoholic criminal has been designated as a particular type; but it is no more true of the alcoholic than of any other criminal that the cause of his behavior is unique. Reasons for crime are manifold, and there is no criminal type, as Healy\* has shown beyond cavil.

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\*The Individual Delinquent. 1915.

1705 N Street.

## MEDICAL STUDIES OF ALCOHOL HALF A CENTURY AGO.\*

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Every vitalized organism is, in large degree, dominated by influences occult, but all pervading. These dynamic energies of the individual originate in the nervous system and are largely under individual control even in the lower species. Communal associations are instructive. By what influence, whence its origin, or who shall measure it? What impels certain species of fishes to seek, at sacrificial effort, the reproduction of their kind by the deposit of spawn in their own birth-place at the head-waters of the rivers thousands of miles from their ocean home? The ant and the bee live in well-regulated, co-operative homes. Whence the controlling power exercised through the centuries?

The evolution of the various species of animals, and the so-called instincts which are the governing factors of their lives, transmitted through a long line of ancestry,—what of the governing force upon the individual? The racial differences of man evolved in varying circumstances and surroundings,—can such influences so modify the individual having an origin in common? What of the development and the result of the individual caused by birth and surroundings?

What of those unseen influences hard to realize and the potent factors which make our lives in large degree what they are, and produce the individuality called character? The endeavor to express our thoughts correctly in a partially mastered language is a painful effort; while in the mother-tongue it becomes automatically unconscious. The expression that this is a 'bad habit' gives emphasis to the ease of repetition of thought and deed. Such habits—good or bad—govern and control the individual ruling and making him what he is. "As a man thinketh so is he."

This moralizing introduces for your consideration the special subject of this paper. It seems almost superfluous to narrate the history of the ill effects of alcohol and the efforts which have been made to abolish its use during the many centuries of the past. From the earliest period of written history, the uses and abuses of the many forms of alcoholic liquors have been commented upon. There is reason to believe that long prior to reliable data, before any claim of civilization could be made, various forms of alcoholic

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\*Opening Address by the Honorary President at the Forty-fifth Annual Meeting of the American Society for the Study of Alcohol and Other Narcotics, Washington, D. C., December 15th-16th, 1915.

liquors were in use. The Egyptians, Greeks and the Romans alike lauded the wine-cup and deprecated its abuses.

For centuries the medical profession, in a rather definite way, recognized the evil resulting from excessive libations and yet encouraged its moderate use, both by precept and example. In the early part of the last century, we find scientific treatises deploring the use of alcohol in any form, because of the injury resulting therefrom, more generally lest it might lead to what they called the misuse of a stimulant, which, under proper conditions, serves to the great advantage of both the sick and the well. Its use was generally commended in the public service. The armies and navies of most of the nations were commonly supplied with a ration in some form, the potent value of which was its alcoholic contents.

Commodore Grogan of the British Navy was immortalized, because he furnished the British Navy with a regular daily supply. The gill of rum furnished each sailor found a grateful response, increasing with a seeming necessity of its use. In perpetuation of his value, as the years went by, it was called 'old Grogg' in memory of Grogan. During our protracted war between the North and the South, every soldier welcomed the daily use of whiskey when it was possible to obtain it. The officers encouraged its use, and to this rule the medical profession was no exception. No business transaction was considered complete unless Bacchus had approved it with his wet seal.

During the period of early American history we find a few men who stoutly denied the advantages which were claimed for alcohol, and attempted to show that even its moderate and customary use was not only productive of harm, but led the way to the forming of habits of the most detrimental character, resulting in debauchery, drunkenness and crime.

Dr. Benjamin Rush was one of the early pioneers in insisting that alcohol in any form resulted only in injury to the physical system. In 1790 he published a dissertation upon the injurious effects of alcohol and tobacco, and his conclusions are quite in accord with the biological teachings of today.

Father Mathew, the apostle of temperance (1790-1856), was educated in Dublin. He entered the Capuchin order and joined the missions in Cork. The temperance movement with which his name is still intimately connected began in 1838 with the establishment of a total abstinence association, and in less than nine months, owing to his remarkable moral influence and eloquence, no less than one hundred and fifty thousand members were enrolled. The movement spread rapidly through Ireland. It became so popular that a hundred thousand persons took the pledge in Galway in two days; seventy thousand in Dublin, in five days. In 1844 Father Mathew visited Liverpool, Manchester and London with almost equal re-



sults. He came to America in 1849, returning in 1851. Father Mathew clubs and societies were formed in many of the cities and towns in America and 'Father Mathew Boys' was a distinctive title. I distinctly remember, when seven years old, attending an enthusiastic meeting, and think I yet have the certificate of membership. The movement was a campaign of teaching not only the evils of intemperance from the excessive use of alcohol, but the physical detriment to the organism resulting from its common daily use in small quantities.

Unfortunately we gather far too little of contemporaneous opinion from the writers of textbooks. One of the chief attractions of autobiographies are the pen pictures of the period. In this respect the autobiography of the late Dr. John C. Warren, of Boston, is of exceptional interest. It portrays the so-called Washingtonian movement, and I can hardly do better than let the doctor tell his own story, since it is contemporaneous and graphic.

"In 1827, I joined the Temperance Society. My father, Dr. John Warren, was vice-president in 1813.

"In the same year I brought forward temperance resolutions in the Massachusetts Medical Society, which, after a violent opposition, particularly from Dr. T——, were carried in a large meeting, with very few dissensions. The Reverend Doctors Channing, Ganett, etc., were the most active men at that time in the temperance cause.

"From that period I have followed up the temperance reformation. Mr. Allen Bradford, Mr. Pierpont, Mr. William Sullivan then gave their aid. Soon after the Orthodox or Calvinist clergy took up the matter, and, by a slow and regular movement, the country was more or less brought under the influence of temperance principles.

"In 1837 I went to England and conferred with the members of the British and Foreign Temperance Society, who were very cordial, and I acted as chairman of a temperance meeting in the heart of the City of London.

"In the same year I had a conference with some members of the administration of King Louis Philippe in France, and laid before them statements showing the importance and the progressive advance of the temperance reform.

"About the year 1840, in consequence of the formation of the Washingtonian Societies, the Massachusetts Temperance Society, the oldest association, suspended its proceedings, resuming its labors occasionally at such opportunities as occurred for making themselves useful.

"In 1848 we made publication of the documents of the Massachusetts Temperance Society, recording the principal facts in its history. At this time (February, 1849) no licenses to retail liquors

are allowed by law in Boston and the greater part of the State of Massachusetts. The same is true also of several other states.

"On the whole, I can with confidence say, that if I had never tasted wine my life would have been more healthy and longer and more comfortable. The efforts which I have been called to make in the temperance reformation, operating as they have done more extensively on the prosperity and happiness of the community, are a source of more satisfaction than any other labors. Probably my other occupations might have been as well, or better, performed by some one else; but perhaps it would have been difficult to find another person who would have been willing to undergo the opposition, ridicule, labor and expense in the cause of temperance."

The limit of this paper permits reference only to two or three more of the great exponents of temperance among the medical men.

The late Dr. Henry D. Didama, of Syracuse, N. Y., furnishes a noteworthy example. Early in life he became convinced that alcohol in any form was not only unnecessary as medicine, but its use was generally harmful. For more than fifty years he was a leader in the medical profession in the State of New York, the founder of the medical department of the University of Syracuse, and a wise and tactful teacher and practitioner. At his death he was president of the National Medical Temperance Association. He published many articles on the effects of alcohol, in both health and disease. Many thousands still hold him in tender, loving remembrance, and I am sure he felt that one of his most valuable services was from his study of the deleterious effects of alcohol upon man.

Dr. Nathan S. Davis, of Chicago, is perhaps the most marked example which the medical profession has furnished in the scientific teaching of the study of alcohol upon the human system. It has been my rare good fortune to be a co-worker in medicine with him, as well as with Dr. Didama, for more than thirty years.

From the very beginning of his medical practice to his last days, he absolutely prohibited the use of alcohol as a therapeutic agent; not only that, but he talked against it to his patients, argued against it before various medical societies and in his more public and popular addresses, and wrote against it in medical and secular periodicals far and wide.

President Eliot of Harvard University, in an address before the Anti-Saloon League, stated that for years he had accepted the use of table wines at the banquet as enjoyable, but that since science had demonstrated that alcohol, taken even in small quantities, is harmful to the organism, he gladly abstains from its use.

Drinking in moderation has always been believed to be beneficial, and the use of wine has been the laudatory subject of poet and

physician. We now class alcohol as a narcotic—a depressant, not a stimulant. In the one case, the temporary relief from nerve irritation; in the other, the unbalancing of this energy, resulting in the dire disasters of loss of energetic equilibrium.

The pendulum has indeed swung wide towards the establishment of a new era. The wave of reform which has recently swept over the entire South and West, banishing the sale of intoxicating liquors over a large part of our great country and bringing with it the period of its greatest prosperity and happiness, is phenomenal. Notwithstanding this is a great cause for rejoicing, it should only serve as an additional stimulus for yet higher endeavor. I would see the great army of over one hundred thousand medical men in America actively enlisted in the teaching and practice of prohibition of the use of alcohol and other narcotics. This indeed, so far as alcohol is concerned, is only one of the valuable services which the country has a right to expect from the royal priesthood of the goddess Hygeia.

My great German teacher, the immortal Virchow, elaborated his Cellular Pathology, which is now given a new interest in the light of very recent investigations. A new galvanometer has been made, so sensitive that it measures the heart beat with astonishing accuracy. The demonstration is satisfactory that muscular energy or nerve force is accompanied by a charge of electricity. Salomson has been able to measure the electrical current which the contraction of the muscle fibre, causing the heart beat, generates. All nutritive changes, even in a single cell, produce a disturbance of the electrical equilibrium and develop a current, be it ever so diminutive. We may regard the body as a vast union of very minute batteries.

This vital force or life energy, in its kaleidoscopic variations, must have its complex electrical apparatus insulated from its surroundings; in a great measure retained by the body coverings, the working of this machine is the individual index of life, perhaps the best definition of life itself. As the atmosphere insulates the earth and retains the energy received from the sun, so the skin, clothing, etc., insulate the individual man or animal, and this force represents the  $x$  factor of life, the sum total of which is lessened by every violation of the laws which govern individual existence.

From modern biological investigations, we may be justified in the assumption that every living cell is a minute electric battery. It is not too far-reaching to suppose that a process similar to electrolysis, which is capable of breaking up the metals into very microscopic fragments and readjusting them in new forms, is constantly going on within our bodies, giving us the best definition of the life processes, which, in health, means a stable equilibrium between waste and repair. Accepting this view, that the total of a



long life, measured by its decades of existence, is the product of this infinitesimal cell transformation and energizing power, *then* it especially becomes us, as *never* before, to emphasize the proper adjustment and maintenance of our vital machinery.

Instil this lesson into young life and demonstrate to each individual that the product of existence is measured by such care and maintenance, then it follows that substances such as alcohol, which are proved to injure the vital processes, will be classed as poisons and the way will be open for a new faith, the reason for which will be easily demonstrated. Through science thus applied, I think I see the wise solution for the cure of the drug habit and that the generations to come will avoid many of the fatal mistakes of their predecessors. The demonstrations of medical science are already ample, if put in practice, to divide the suffering, double the working capacity, and increase the longevity of the race by a third. Let teacher and the taught unite in a holy war for regenerated *bodies* as well as souls, and in the upper realms of the beyond, with the immortal hosts, we shall chant together the Hosannas of these new and greater victories.

The drink evil has its inception primarily in two special causes, both of which are of remote origin. Until a generation ago, the medical profession was largely at fault, believing the moderate use of good liquors to be a real physical benefit. This was an inherited belief, descending from the remotest periods of history. The second, and by far the most potent cause, is found in the physical comfort which follows the moderate use of alcohol acting as a mild opiate, seconded by the exhilaration of a change of mental activity, which from time immemorial has been called the good cheer of the social cup.

Man is an animal of habit in all his activities. It is a fundamental law of all the processes of life—physical, mental, and moral. "We grow in that we feed upon." This law in a measure controls our very existence. By it our tastes are educated and our daily diet is largely controlled. The likes and dislikes of food are educational tastes. Oftentimes they seem to dominate the nations. The Italian would hardly be satisfied without the flavor of garlic, or the Mexican without that of pepper.

Wine has been considered the controlling spirit of the feast. Courtesy as practised by all classes of men required the social glass of good-fellowship, and usage was fortified by the belief that, in moderate quantities, alcoholic preparations aided digestion, improved nutrition, and strengthened the body generally. It is easy to note the growing insistence of its use. The gentleman of wealth and position most naturally welcomed his guest at his own table. To fill a long felt want, on the part of those less fortunately situated,

there arose the common meeting-place, in the better circles denominated the 'club,' and among the poorer classes, the bar-room.

It is perfectly evident that the best way of lessening bad habits is not to contract them, and of bad tastes, not to develop them. The potent power of alcohol to produce injury and only injury to the individual is now accepted as a scientific fact. The way not to like it is not to use it, not to learn to like it, for it is a taste which has to be educated, although easily acquired. If the leaders of society will banish wines from their tables they will set an example potent for good. If the young men note the social conviviality of their seniors, as they linger over their wines in the enjoyment of a story-telling evening, is it not to be expected that the influence of example will have a far greater effect than the homily upon temperance delivered in a church vestry?

I suppose the preacher of even a lay sermon is expected to select some text more or less befitting the subject of his discourse. Therefore I have chosen I Timothy, V:23—"Drink no longer water, but use a little wine for thy stomach's sake and thine often infirmities."

In these days of biblical exegesis the reverential respect of the fathers has become badly shaken. With perfect complacency, we now revise the revision of the revised word until, like the boy's jackknife, the new handle, fitted to the new blade, is still claimed to be the same old knife.

The first revision was in the earlier day, when the crusaders of the new temperance faith openly absolved allegiance to King Alcohol, declaring that public tipping at the house of the tapster should be abolished. The temperance lecturers dwelt on the evils and the doom of these open enlisted followers of the King, and the picture of the physical, financial and moral ruin of these men was so graphically depicted that every listener would have had a delirium of nightmare, had he not conscientiously believed that the photographic vision was of the 'other fellow' and not of himself. These same moral temperance teachers accepted it as orthodox that whiskey, brandy, rum, gin, etc., were excellent medicines, and that when the tides of life ran low they were indispensable to tone and brace up the general system.

After showing that the rôle of these so-called remedial agents was founded in a misconception of a conservative prejudice descended from the fathers, it was asserted and abundantly proved that strong alcoholic drinks were injudicious as medicines, rarely if ever to be administered for the good of the patient. Still further revision showed that when these stimulants were taken, even in small doses, but in daily repetition, certain chronic changes of the tissues ensued; that such individuals, although seemingly well, often added unduly to their weight by the lack of elimination of waste material, and that they became subject to certain chronic dis-

eases affecting especially the kidney and liver. Then it was demonstrated that the resistant power of the organism to disease lessened; as an illustration, an increased tendency to tuberculosis, arteriosclerosis, etc. A still more careful analysis of these revisors went to prove that the experience of the centuries was all wrong; that the witness, who in January testified most earnestly that he drank alcohol and it warmed him, was considered prejudiced, especially when it was shown in evidence that the same individual claimed that after taking his favorite beverage in July, he was cooled thereby.

The physiologist who became a member of this investigating committee, after prolonged and profound research, showed that the especial monitors—God's sentinels at the inner gate of our consciousness—had been more or less narcotized, and therefore did not correctly report the state of the weather. Following this new lead of investigation, it was demonstrated that in perfectly healthy young individuals selected for the test, moderate doses of alcohol lessened the special senses in an almost uniform ratio, so that vision, hearing, smell, taste, touch, muscular force, were all appreciably lessened. It followed that the endurance and fighting qualities of the soldier and sailor were impaired; that the soldier cannot march so far, endure hardship as well, or shoot as accurately, and that since each soldier of the United States represents an average annual cost to the government of one thousand dollars, therefore the economics of the equation demanded that as a fighting machine his ability should not be impaired by the taking of alcohol.

The revisors were even now not satisfied. By further scientific investigation they attempted to prove that alcohol, in all its different forms of drink, is alcohol still, and that it does not matter whether it represents a weak solution, as ale, beer, cider, or light wines. In other words, that an ounce of alcohol taken in a quart of beer, or in a pint of light wine, is just as injurious as if diluted in the same amount of water; that it is a poison, and exerts its influence on the tissues in a directly relative manner.

Now if this is the modern scientific explanation of the effect of alcohol on the animal tissues, where will we find the truth of our text as announced by the great Apostle? And why should we not accept the teachings of our forefathers, fortified by the experiences of the centuries, that the discomforts due to a defective digestive process might be speedily relieved by a dose of hot toddy? Our physiologist says the sensation of discomfort is relieved as by a narcotic, rather than removed by the remedy.

Some scientists stoutly affirm that a small quantity of alcohol may be safely oxidized in the tissues, and have gone so far as to state that the average healthy adult may thus dispose of two ounces of alcohol in twenty-four hours, transposing it by a process of oxidation into heat units. But the same opinion is carefully qualified



by the statement that the temperature of the individual may be maintained more easily and safely by the transposition of ordinary food products.

If this brief resumé of the physiologic effect is correct (and in the support of this opinion it is easy to quote a long array of the best modern scientists), what can be said in favor of the uses of wine, as table beverages?

In every generation and among all peoples, the vine has been cultivated and its products held in highest esteem. Poets have vied with one another in singing its praises, and the grape in its many varieties has justly held a high place in public favor. Inasmuch as it was impossible to supply this fruit in perfection in general use, except for a brief period of the year, it was perfectly natural that some measures should be devised for better preservation, and it was easy to determine that this was not possible, except through the processes of fermentation, which modified their juices, and by the addition of a considerable amount of alcohol under favorable conditions, which rendered permanent their keeping qualities.

Very modern science has taught the causes which produce in great variety the flavor or bouquet which renders wines so desirable. The general public has been taught for the most part only the injurious rôle of the bacterium, so that, indeed, it is often stigmatized as deadly. The fine flavors of the high-priced creamery butter are now very commonly produced by the introduction into the cream of a special variety of bacteria cultivated for the purpose. Cheese owes its flavor to certain forms of these organisms. Of more recent demonstration is the proof that, in the fermentative process of wine-making, certain bacteria may be introduced, producing the much-desired flavors of the high-cost vintage, supposed possible of securing only in certain specially favored cellars. The wise custodians of these establishments had for many years religiously believed not only in the even temperature and dryness of their cellars, but had insisted on the advantage of letting them remain from year to year absolutely uncleaned.

In this way certain ferments were preserved indefinitely, and were thus accidentally introduced into the ripening wine. Profiting by this, selected varieties of bacteria are now cultivated with the assurance of an annual product of high-grade wines. Thus it is demonstrated that it is not the percentage of alcohol which causes these wines to be so high-priced and much sought after, but something else. And we may well ask ourselves if modern science may not give us this something else in even more desirable form and eliminate the alcohol.

Underlying all this as an occult initiatory force are the ethics and esthetics of emotion—social impulses deep-seated in every individual in every station of life. It is but natural that this force

should find expression in supplying the demand of bodily need. The same force, little understood or recognized, in great measure permeates and controls society. It dictates to and governs the individual in personal adornment. Fashion, with infinite variations, has dominated all races and peoples. Personal embellishment controls alike the savage and leaders of modern society. This has a good as well as an evil influence, and at its best, is an expression of the personal equation of self-respecting ranks or positions. Anyone who analyzes social problems must recognize this power, and he who would elevate his people must utilize it as a fundamental factor. Here lies the secret of combating the social drink evil. Let us recognize the social cup, but fill it with that which cheers but does not inebriate.

We are all singularly creatures of habit. We become so wedded to certain tastes and flavors that the deprivation of the same is held by the individual as a more or less positive detriment. This brings us to a subdivision of our subject to which I can only allude—the so-called flavors, condiments, relishes, etc. The physiologist will tell you that there is a reason why every man requires salt in his daily food, but he will be troubled to explain the almost equally universal demand of the Mexican for the extraordinary use of pepper and that of the Italian for garlic.

It would be hardihood on the part of any scientist to advocate the adoption of the universal ration, although he can demonstrate most definitely that a healthy individual of a fixed weight requires certain amounts of starch, fat, and proteids. When we add to these fundamental elements of nutrition the thousand and one various modifications of food, we recognize that we are doing it chiefly for the purpose of making our daily diet more attractive and giving a better relish to food.

The modern miracle of the preservation and transportation of food stuffs renders it possible to place on our tables the products of all climates at reasonable cost and in excellent condition. The banana, a generation ago a rare and expensive tropical fruit, has become of almost daily use, even in the homes of those of limited circumstances. Preservation by use of cold storage has worked a wondrous change in the continuous supply of fruits. At a slight increase of expense, apples are abundant in the market for the larger portion of the year. This is true also of oranges, lemons, etc. The strawberry, from its first fruiting in Florida until the end of the season in Nova Scotia, furnishes an abundance of delicious fruit at moderate cost. These are selected as illustrations of the wonderful modern progress which permits the table of even limited income to be supplied with healthful accessories to diet which serve as relishes to the appetite rather than absolute necessities for the preservation of existence.

That which is true of fruits is also true of modern beverages, which more properly are classed as relishes, or aids to appetite. Pleasant refreshing drinks in daily use are made from these fruits, as lemonade, fruit sherbets, etc. Scientific processes are yet greatly to lessen the cost of fruit juices and proportionately wisely to increase their use. Modern processes render it perfectly feasible to concentrate the juice of a lemon into a quarter of an ounce of fluid and render its preservation indefinite, thereby reducing the cost to the consumer, with equal profit to the grower, by three quarters. That which is true of the lemon is true of many other fruits, especially the grape. The larger expense of light wines lies in the hitherto necessary bottling and handling of the large factor of its bulk, which is only water. By the careful abstraction of water, claret is easily reduced in bulk by three quarters. These condensed wines keep much better and are ready for use by the simple addition of water. This process is already in use in France and has been enthusiastically recommended. The abstraction of the water without damage to the wine by any of the heat processes, has proved impossible since the delicate aroma, the chief attraction of the wine, is thrown off even more rapidly than its alcoholic contents.

Somewhat recently advantage has been taken of the fact that the water, in fluids submitted to low temperature under favorable conditions, becomes ice crystals, entirely free from admixtures which the fluid contained. Therefore wines submitted to the same process parted with a large share of their bulk without loss of their alcoholic or other essential qualities. Fruit juices submitted to this process are easily concentrated, and there is every reason to believe that in this way very many additions can be made to our table delicacies. Most delicious beverages which many think are preferable to our most costly wines, can be manufactured in this way, preserving without detriment the exquisite flavors and colors of the carefully ripened fruit. That such beverages are beneficial no one can question, and they may be destined, in a degree at least, to supplant our enormously excessive use of tea, coffee, and alcoholic stimulants.

It is not too much to believe that revolution in the drinking habit may be expected with an almost limitless profit to the consumer. In the place of table wines, as now used by the comparative few and now believed to be demonstrated of positive injury when habitually taken, there will be furnished the fresh juices of the grape and other fruits, which, constantly used from youth to old age, will be found healthful and invigorating.

When a man may be better clothed, better housed and better fed, he is no longer satisfied with his former estate. When he may drink freely without being intoxicated, when he may have more delicious drinks which appeal to his appetite, without detriment to



his physical well-being, he will readily make choice of his new beverages. Another step in the progress of civilization has been made and a new era is opened up to him. Modern science is the magic transformer of the centuries.

The present condition of the temperance movement in America is phenomenal, owing in large degree to scientific instruction. Forty-six million American citizens, nearly one-half of our total population, are living under license laws. Eighteen states have adopted prohibition. The temperance forces are in active co-operation. Petitions by the tens of thousands have been finding their way to Washington each day. More than three million were received while the Constitutional amendment was under discussion in committee last spring.

The unwritten record of the injury which alcoholic drinks played in our Civil War is beyond estimate. From the private in the ranks to the officer in command, all soldiers had been taught to feel the value of so-called *alcoholic stimulants*. Whenever it was possible their use was constant. Many a battlefield was lost owing to the influence of this pernicious drug. We can now understand why in the armies and navies of all the nations of the world, alcoholic drinks are either prohibited or used in very limited quantities. The science of to-day gives clear demonstration that almost in proportion to the amount of alcohol taken, efficiency is lessened. The soldier cannot march as far, shoot as straight, nor is his power to resist disease as sure a protection with alcohol as without it. We are now witnessing the greatest tragedy the world has ever seen. History records no calamity so overwhelming. It is interesting to note that Russia has abolished the sale of alcoholic drink in her entire domains since its outbreak. Doubtless the excesses and outrages by the German soldiery are in part attributable to the influence of alcohol, to the great temptation from the capture of immense storehouses stocked with the vintages of Belgium and Northern France. A poster has been widely distributed signed by many of England's foremost medical authorities, as follows:—

#### EFFECTS OF ALCOHOL

ON

Naval and Military Work

TO ALL MEN SERVING THE EMPIRE

It has been proved by the most careful

SCIENTIFIC EXPERIMENTS

and completely confirmed by actual experience in

ATHLETICS AND WAR

as attested by

FIELD-MARSHAL LORD ROBERTS,

V.C., K.G., K.P.

FIELD-MARSHAL LORD WOLSELEY,

K.P., G.C.B.

and many other Army Leaders, that

ALCOHOL OR DRINK,

- (1) Slows the power to see signals,
- (2) Confuses proper judgment,
- (3) Spoils accurate shooting,
- (4) Hastens fatigue,
- (5) Lessens resistance to disease and exposure,
- (6) Increases shock from wounds.

It is a singular paradox that this most devastating European war, unparalleled in history, is being fought by millions of soldiers, all marching under the banners of temperance.

180 Commonwealth Avenue.

## THE RATIONAL CONSIDERATION OF NARCOTIC ADDICTION.

By ERNEST S. BISHOP, M. D., of New York,

Clinical Professor of Medicine, New York Polyclinic Medical School and Hospital; Visiting Physician, St. Joseph's Hospital for Tuberculous Patients, etc. etc.

There is only one way for a physician to treat addiction to a narcotic drug, and that is, as in any other disease, by the rational application of teaching and clinical experience and study to the problems presented in the individual case.

Some time ago I received a letter from the Henry Ford Hospital, in Detroit, stating that their trial of the so-called 'Town's treatment' had not proved a success. They asked me, as I am frequently asked by others, for advice on the management and treatment of addicts. Perhaps a quotation from my reply to them would state my ground in this matter. It is as follows:—

"While in Bellevue, after failure with the various methods, I began to realize that the solution of the narcotic drug problem lay not in any one method, or treatment, or cure, but in the determination of what disease processes constituted the condition which we had called 'drug habit.' I began a clinical study of the cases admitted to the alcoholic and prison wards—putting out of my mind all previous teaching and conceptions—simply gathering clinical observation of actual physical manifestations. From the study, analysis and correlation and attempt at explanation of these, I began to see definite symptom-complexes and constant and characteristic physical reactions and to understand how hopeless was any search for a routine or even a general method which would meet all indications."

The man who is to treat narcotic drug addiction successfully must have an understanding of its disease mechanism and symptomatology. He must also understand the actions of, and rational indications for, whatever remedies or measures are to be employed in its relief. In other words, he must study the disease in its pathology, symptomatology and therapeutics, just as he would any other disease. There is no royal road, nor is there any possible panacea, specific or routine cure. It is absurd to expect any one treatment to offer even an acceptable apology for a successful solution of the care of cases of different drug addictions, or of the care of different cases of addiction to the same drug. Whoever is to carry out drug work successfully must make up his mind to study and live by the bedside of patients until he knows his disease fundamentals and can clinically appreciate symptoms and their significance, and knows how to meet indications as they arise. A man who knows his disease can have a considerable success with almost any method if he rationally modifies it and departs from it as indicated. His success, however, just as in treatment of any other disease, is not to be attributed to the method he employs so much as to his own personal understanding of the work he is doing and to his clinical competency and medical ability. This is true of all other disease



and it is equally true of narcotic drug conditions. The best of methods will fail in the hands of the routine and superficial administrator, while many methods far inferior will meet with comparative success in the hands of the intelligent physician who has studied and understands his disease.

The work I have done could be reduced to and published as a method of treatment by formulating average procedure. This I have been repeatedly asked to do and have consistently refused to do. I could write up an average procedure as a treatment or method which might be an advance on anything of the sort yet devised. I realize, however, that such an exposition would be taken up and attempted as a routine by the average majority of physicians without sufficient conception of the real character and nature of the disease they treat. I know also that the average result would be failure and the addition of another 'cure' to the already existing superfluity of 'cures' and 'treatments' which have distracted from and handicapped progress in the study of disease.

I have for the past year been giving in the Polyclinic Graduate Medical School a course of lectures and clinical instruction on the toxic, functional and narcotic states. That the intelligent physician, given an understanding of the pathology, symptomatology and mechanism of production of narcotic drug addiction, and given some clinical instruction and practical demonstration in the rational therapeutic measures employed to meet the indications, can successfully treat narcotic drug cases, reports from students who have gone home and accomplished satisfactory results in private practice prove. I teach them the disease mechanism and manifestations and varying action and reaction as they are present in the narcotic addict. I teach them how the addict reacts to the drug of his addiction at different times and under different conditions, and how he reacts to other drugs and conditions as a result of the existence of his addiction mechanism. I teach them the elements and methods of true elimination as contrasted with excessive, ill-advised and harmful purgation which defeats through over irritation and exhaustion the obtaining of real elimination. I teach them how to measure action and reaction, physical resistance, organic competency and balance, and functional interaction. I teach them how to estimate and control inhibition and the extent of organic and functional dependence on a drug. I repeatedly emphasize and warn them that there is not and cannot be any specific, anything approximating a routine or a set form of procedure, or set medication, or set dosage.

All these things must be to some measure understood before a man can hope competently to handle a drug case or drug cases. The mere withdrawing of his drug is not by any means a cure and the stage of actual withdrawal of the drug is not by any means the most important part of treatment. Like any other disease the whole disease and its stages must be appreciated, and the conditions, which influence and complicate its symptomatology and make its manifestations so greatly varying, must be understood. It must be clinically studied and its varying signs made matters of competent personal comprehension and appreciation. Narcotic drug addiction must be gone at just like any other disease and mastered by study and clinical experience before competent treatment of it is possible. It can never be successfully approached in any other way;

and the man who is to treat cases successfully must appreciate this fact.

What I have written above demonstrates the impossibility of writing in one paper an exposition of the treatment of narcotic drug addiction which would not be misleading and harmful. In the bulk of medical literature on the subject of narcotic drug treatment the actual withdrawal of the drug has been the end upon which attention has been focused and has dominated indications for procedure. Treatment directed to the final withdrawal of the drug from the patient is not by any means of paramount importance. The final withdrawal of the drug is only one step in the conduct of a case, and its ease and success of accomplishment depend far more upon the condition into which the case can be got preparatory to the stage of withdrawal than it does upon the mere amount which that patient is taking. One of the greatest mistakes hitherto has been the persistent focusing of attention upon the taking away of the drug and the devising of means to this end. It is just as reasonable to regard the treatment of the stage of crisis in pneumonia as all that is necessary to handling a pneumonia case. The condition in which a pneumonia patient reaches his crisis is the important factor in the treatment of the crisis and in its successful issue.

One of the greatest oversights and neglects has been the almost total lack of clinical study and analysis of the many considerations and conditions other than the mere taking of drugs. These considerations and conditions determine wide variations in the clinical picture and disease manifestations to be met in individual cases. Different stages of the disease require different handling. Different individuals present different problems in physical reaction and physical resistance to the action of narcotic drugs. To attempt cure of all patients by any routine method, or by anything approximating a routine method within a definite length of time, is certainly not rational medicine. It is just as abortive of satisfactory results in any considerable number of cases of narcotic addiction as it is in the treatment of any other disease. It spells either medical ignorance or something approaching very close to charlatanism; and the wide acceptance of such methods through publicity simply postpones the day when decent, competent attention will be given to actual study of disease and disease fundamentals. This in my opinion has been one of the greatest harms done by the wide advertising of the various 'treatments' and 'cures,' and I hope the day is not far distant when their power will give way to rational and competent clinical study of disease and to the non-spectacular dissemination of fact and knowledge of disease and disease fundamentals and disease processes.

Since what I have written is my conception of the general problem of the medical treatment of narcotic addiction, it is manifestly impossible for me to attempt a broad exposition of treatment of this disease within the confines of one paper. Such an attempt would be incomplete, misleading and dangerous. I shall therefore confine myself to the discussion of a few fundamental and important considerations which have a practical bearing in the handling of a narcotic addict.

First, and of great importance is the attitude of the doctor toward his patient. The physician who is to treat a case of narcotic



addiction successfully to the end of curing his patient, or who is treating narcotic addiction as an intercurrent condition complicating another disease, must first of all make his patient realize that the physician himself knows something about narcotic addiction as a disease. He must never give his patient any hint or reason to suspect that he regards narcotic addiction as a habit, a vice, a degrading indulgence which can be to any curative, or even therapeutic extent, combated by the exercise of will power.

The vast majority of addicts have, in their desperation and ignorance, exercised will power in self-denial of their drug to the limits of their physical endurance, and they know the futility and suffering of such attempts. Experience has taught them actual facts concerning the physical action of narcotic drugs and concerning the results of insufficient supply of narcotic drug in a man who is addicted. The addict knows that he does not take a drug because he enjoys it. He knows that he experiences no sensuous gratification or other pleasure from its administration. He knows that he uses a narcotic drug simply and solely because he has to use it to escape physical incompetence and physical agony. As I said before, almost without exception the narcotic addict has proceeded of his own accord, or under the direction and advice of others, on the theory of exercising will power, and resisting temptation. With the few exceptions of those made in a very early stage and before addiction mechanism had become strongly developed and rooted in his physical processes, such efforts on the basis of this theory have been useless. It is practically impossible to argue successfully on the basis of theory with a man who has experienced facts. Narcotic addiction furnishes a class of patients who know more about their own disease than any other class of people in the world. They can accurately estimate the extent of understanding and knowledge possessed by the man who is treating them, and they are desperately critical. Almost without exception they desire above all else to escape from their condition. I know that this is not the popular conception and for the present may be regarded as heresy; but I assure you that it is absolutely true. Therefore, it is of prime importance that between the doctor who treats an addict and the addict himself must exist cooperation and understanding. As soon as a patient realizes two things—that the doctor does not believe in his expressed wish to be cured, and that he regards his desire for relief from suffering as an expression of habit, or vice, or degraded appetite, to be controlled by the exercise of will power,—there is an end to that patient's confidence in that doctor and to the help that doctor can give to that patient. As I have written elsewhere, the narcotic addict will cooperate with his adviser to the extent of his physical endurance so long as he has any belief in his adviser's ability to cure him. In my own work and as a result of my own experience I have found that the extent to which my patient cooperates with me is a measure of the ability with which I treat him rather than a measure of his desire to be cured.

Two years ago I wrote the following: "As to the existing opinion that the morphinist does not want to be cured and that while under treatment he cannot be trusted and will not cooperate but will secretly secure and use his drug, I can only quote from personal experience with these cases. During my early attempts with the methods of sudden deprivation and gradual reduction, and later



with the routine so-called 'Towns treatment,' my patients beginning with the best intentions in the world often tried to beg, steal, or get in any possible way the drug of their addiction. Like others I placed the blame upon their weakness of will and lack of determination to get rid of their malady. Later I realized the fact that the blame rested entirely upon the shoulders of my medical inefficiency and my lack of understanding and ability to observe and interpret. The morphinist as a rule will cooperate and will suffer to the limit of his endurance. Demanding cooperation of a case of morphinism during and following incompetent withdrawal of the drug is much like asking a man to cooperate for an indefinite period in his own torture. There is a limit to everyone's power of endurance of suffering."

Of primary importance then, if you are to have any success in your handling of a case of narcotic drug addiction, is your attitude toward your patient,—divesting yourself of all conception of habit, appetite or vice, and approaching him as a man with a definite disease requiring and deserving intelligent clinical handling. He will be the very first to mark your shortcomings. And if you have not his confidence you can help him but little.

As to the nature and character and mechanism of this disease I have written recently in my "Analysis of Narcotic Drug Addiction" and shall not discuss it in this paper.

In the actual therapeutic handling of cases of narcotic addiction there are three clinical demonstrable elements to be determined, measured and controlled. The first of these is the actual amount of drug which the patient's body demands to maintain functional and organic efficiency and to escape physical distress. The second of these is the extent of auto and intestinal intoxication and malnutrition. The third of these which is both a result of and a causative element in the other two is the extent of inhibition of function.

The first effort, therefore, in the successful handling of a case of narcotic addiction is this: to determine exactly the amount of the patient's minimum daily physical need for the drug of his addiction. This need is clinically recognizable and definitely measurable. It should be satisfied to whatever extent it is present so long as competent treatment has not diminished its extent. This need can be demonstrated and accurately measured by clean-cut symptomatology. It can be expressed in mathematical terms of amounts of drug required in twenty-four hours. Work, worry, strain,—anything which consumes physical or nervous energy increases this need. If this physical need is not satisfied the patient is robbed of physical tone and of physical reaction. He is robbed of metabolic balance and functional competency. He is, in short, robbed of the basic ability which his body has to regain health. In the estimation of this amount of minimum daily need at any given time the procedure is very simple. Administer to your patient who is manifesting the symptomatology of drug need, sufficient drug to remove the symptoms and restore him to complete balance. Carefully observe the length of time which elapses before the symptoms of drug need reappear. You then know that a given amount of that drug will hold that patient in drug balance for a certain length of time, and you have mathematically estimated the extent of his need. His need for twenty-four hours can be easily computed once you have determined the above fact. It is merely a matter of arithmetic. If

one grain will last a given patient at a given time for four hours, two grains will last him approximately eight hours, etc. This amount is the amount of his actual need and it should be administered to him until by his clinical symptomatology and physical manifestations is demonstrated the fact that the amount of need has been reduced. It is much wiser to supply the drug in the amount of actual need than it is to make any attempt to reduce the amount of drug before you have reduced the extent of need. The success of your progress in treating your case is not to be measured by the amount of drug your patient is taking, but is to be measured by your patient's condition and the clinical manifestations of need for that drug. It is practically as impossible for the man whose minimum daily need is one-half grain of morphine to give up by any process of will power that half a grain without unbearable agony and suffering as it is for the patient who is taking five grains a day or even larger quantities. Because you may have succeeded in reducing your patient over a period of days and weeks and months from a large dose to a fraction of a grain, or indeed have denied him any drug at all for a considerable time, do not believe that you have cured your patient and do not be assured that you have made marked progress in the handling of his case. Unless the physical mechanism of body need for a narcotic drug has been completely and actually quieted, your patient will have in his body for perhaps weeks and months after your last administration of the drug an organic need for it. The taking of morphine does not constitute morphine disease. The mere fact that the addict is no longer taking morphine does not constitute proof that he is cured of morphine addiction. The non-recognition of this fact lies at the root of much past failure. The axiomatic statement is this—an addict should be supplied with the drug of his addiction to the complete extent of his physical need, at any given time. The amount of drug used by a patient in twenty-four hours is a matter of very minor importance compared with the general health, physical tone, nervous balance, reaction and resistance of that patient. Also the amount of drug taken by a patient in twenty-four hours is absolutely no measure of the strength or stage of development of his addiction. If he does not get enough drug he cannot competently functionate; he cannot be adequately nourished; he cannot sufficiently eliminate. It is far easier to eradicate completely and successfully narcotic drug disease in a short time and without marked discomfort from a healthy well-reacting man who is using four grains a day than it is from a nerve racked, worried and physically exhausted non-functionating wreck who is using one-half a grain. It is therefore much wiser to direct your present efforts to the securing and maintaining of health, reaction and tone—irrespective of the amount of drug used—until you have time and opportunity to investigate and become acquainted with the rational treatment of the stage of actual withdrawal.

In the administration of drug in the amount of daily need remember this: administer your doses in sufficient amount to allow the patient long intervals between doses. On this you will have to experiment in the individual case. If a patient's daily need is three grains a day, it is much wiser to administer this amount of drug in doses of one grain three times a day, or a grain and a half twice a day as soon as possible, than it is



to administer larger numbers of smaller doses at more frequent intervals. The reason is this: apparently after a dose of narcotic drug is administered function is inhibited for a length of time which is not in proportion to the size of the dose administered. On the other hand, within comparatively broad limits, the length of time over which a dose of narcotic drug will hold a patient in drug balance and free from the physical manifestations of drug need is in proportion to the size of the dose. Therefore large doses at wide intervals permit greatest freedom from functional inhibition and as well, if not better, supply the demands of drug need.

I have spoken of the element of intestinal and auto-intoxication. Intestinal and auto-intoxication combined with worry, fear and anxiety constitute the causative and controlling element in whatever mental and physical deterioration is present in a case of narcotic drug addiction. Physical, mental and moral deterioration are to a very small extent direct results of narcotic drug action per se. As long as a narcotic addict is maintained non-toxic, uninhibited and unworried, he is practically a normal man with an extra physical need. It should not be necessary to recall to your memory many cases of upright, honorable and competent and apparently healthy men and women who have been narcotic addicts over many years unknown to but very few or none of their relatives or friends, or even physicians. Their apparent immunity to the supposed stigmata of narcotic drug action was not due to the fact that they were on a higher mental or moral plane than their less fortunate fellows or that they were possessed of sufficient will power to resist temptation in the over indulgence of their so-called appetite. The facts in plain English are that by experience they found out that if they used the amount of drug they needed and did not take it too often and kept their bowels open and did not worry, they were as normal as anybody else except for the fact that they had to take a dose of medicine two or three times a day. In other words, they simply learned how to manage their disease in a way to avoid complications. They met their issue squarely; they discounted theory and recognized facts and they applied common sense to the application of what they learned.

The control of auto and intestinal intoxication in narcotic addiction is as a rule a matter of easy accomplishment if the patient is in drug balance and is not over-supplied or under-supplied with the drug of his addiction. The narcotic addict who is non-toxic and in drug balance and is not harassed by worry or fear needs practically no more drastic methods of elimination than his non-addicted brother. If he is over-dosed his elimination is inhibited; if he is under-dosed his eliminative powers are not capable of response. The element in the securing of evacuation of the bowel in a drug case, as well as in a toxic case of whatever description, is sluggish peristalsis; in other words, it is inhibition of nervous impulse. It is therefore not necessary to load a bowel up with large amounts of drastic and irritating cathartics. Indeed this procedure is very harmful and abortive of ultimate results. An over-irritated intestinal tract is not a good eliminative organ. To my mind the so-called typical stool of the so-called 'Towns treatment' with its content of jelly mucus has no clinical significance other than its evidence of a production of an exhaustive and irritative mucous colitis and means that however much purging may be accomplished



competent elimination from the colon is at an end. Its appearance in a case under my care I should regard as evidence of injudicious treatment. For the bowel elimination of a case of narcotic addiction there is needed practically nothing beyond the ordinary mild and non-irritating catharsis. All that is needed is to remember that if inhibition of peristalsis has not as yet been overcome, you may be wise to administer, about the time you should get an evacuation, strychnine or other peristaltic stimulators in sufficient amounts to overcome existing inhibition and stimulate peristalsis.

I have mentioned inhibition of function as a basic factor in the development and maintaining of the narcotic drug condition. It is of great importance to recognize, estimate and control its presence and influence. Inhibition of function is due to nervous exhaustion from worry, fear, anxiety and suffering; it follows for a few hours the administration of narcotic drugs; it is a constant result of chronic constipation and of intestinal and auto-toxemia. The rationale of its control is evident and has already been suggested,—counteract its influence with a peristaltic stimulator in sufficient doses to secure results at the time of desired evacuation, until you have in so far as possible removed its presence by the elimination or control of its causes.

But one word more. I cannot resist the temptation at this time to go on record in absolute opposition to and unbelief in drugs or combinations of drugs for which has been claimed specific action in the cure of narcotic addiction. I want to state emphatically that although I frequently employ the products of the belladonna and hyoscyamus group of drugs—scopolamine most frequently—in the treatment of my cases, I use them in that treatment simply and solely as they meet individual clinical and therapeutic indications. Pettey, of Memphis, took this stand years ago. I do not regard these drugs as curative of addiction disease, and I do not always use them. I use them when and as indicated in the individual case, exactly as I would and sometimes do in the treatment of other conditions. I want it distinctly understood that I do not give a hyoscine treatment, a scopolamine treatment, or any other kind of specific treatment, and I do not believe that procedure of any such description is possible as useful therapeutics. I regard scopolamine, hyoscine, and the various other products of the belladonna group as extremely dangerous drugs to be routinely used in the treatment of narcotic cases. They are only rendered safe after personal experience and study into their action and appreciation of the factors and influences which control their action in the functional, toxic and narcotic drug conditions. The routine and unintelligent use of the products of this group of drugs in the treatment of narcotic addiction—under the mistaken impression that they somehow or other have direct curative action upon the disease condition, has been the cause of a considerable mortality and an easily understood opposition. Hyoscine or scopolamine, and the other members of this group, are at times useful drugs to meet indications in the treatment of a case. They are, however, no more useful than strychnine, cathartics, kindness and consideration, understanding and intelligence or any of the other therapeutic measures in our possession.

I do not conceive it necessary to express my opinion of the various methods and treatments. In the history of all branches of medicine and therapeutics appears the search for specifics, panaceas

and special remedies as a transition stage in progress toward appreciation, actual knowledge and understanding of disease processes, and rational therapeutics. We are just emerging from this transition stage in the treatment of narcotic drug addiction. Instruction and education, based upon honest and competent clinical and laboratory study and findings, must before long replace with clinical understanding and rational therapeutics the following of routine procedure and supposedly specific remedies.

The solution of the drug problem in this country lies not in the pursuit of specific remedies and special treatments, but in the realization by the medical profession that narcotic drug addiction is a definite disease worthy of extensive clinical and laboratory investigation and study such as has been accorded to other diseases. It lies in the recognition of the disease processes which cause the symptomatology and phenomena of body need for a narcotic drug. It lies in the admission of narcotic drug addiction disease to its legitimate place as an accepted part of the practice of internal medicine. It lies in the education of the competent practitioners.

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## THE CIGARETTE AS RELATED TO MORAL REFORM.

By D. H. KRESS, M. D., of Washington, D. C.,  
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There exists a very intimate relation between a man's physical habits and what he is morally. Possibly there exists a physical cause for every immoral act and crime committed.

Crime and immorality are the visible expression of an abnormal physical and mental derangement due either to heredity or bad habits, or both. For this reason efforts in moral reform are usually a failure, unless accompanied by a reformation of physical habits.

During the past century or two the average age of civilized man has been considerably prolonged. But while there has been an increase in the average age, the maximum age is diminishing. The increase in the average age of life is chiefly due to improved sanitation and public hygiene, while the decrease in the maximum age is due to lack of personal hygiene. We have made clean the outside of the cup, but have failed in making clean the inside. More stress has been laid on the need of clean streets and back yards than upon clean blood and tissues.

Carrel, of the Rockefeller Institute, whose extraordinary researches are well known, has shown that an intimate relation exists between the length of time tissue lies separate from the body and the medium which surrounds it. He has demonstrated that the matter of keeping alive such tissue was not so much a question of its age as of the quality of the fluid in which it was kept. In his experiments he has verified the biblical truth that "the life is in the blood." Foreign, or poisonous, products in the blood injure the tissue and shorten its life.

Any substance which acts injuriously upon the tissues also tends to injure the morals. Alcohol is for this reason a causative factor of both physical and moral degeneracy. But alcohol has a twin sister in tobacco. Where one is you invariably find the other. Horace Greeley once said, "Show me a drunkard who does not smoke and I will show you a white black bird." It is difficult to determine accurately, therefore, how much of the present physical and moral degeneracy to ascribe to alcohol and how much to tobacco.

So much has been said and written about nicotine that I feel some reluctance in even referring to it. I might briefly state that while nicotine is a narcotic poison, within the body it acts temporarily as a heart and brain irritant. It causes a functional constriction of the blood vessels, thereby raising the blood-pressure. The excitation is, however, soon followed by its narcotic effect and a state of depression. This creates a demand for its repeated use in order to keep up the feeling of physical and mental fitness. This explains why a tobacco addict is only at his best when smoking. In time, from the continuous irritation produced, structural changes take place in the various glands of the body which have to deal with it, and later in the circulatory system. The liver, kidneys and other vital organs whose work it is to keep the blood freed from poisons, wear out prematurely. The elastic muscular tissues of the blood vessels, which normally aid in propelling the blood throughout the body, are



rapidly replaced by hard, unyielding fibrous or scar tissues. The calibre of the blood vessels is thus lessened and an extra effort is demanded by the heart to propel the blood through them. This causes hypertrophy of the heart muscles and increased pressure. The extra burden thrown upon the degenerate heart and the abnormal pressure within the diseased arteries ultimately result in heart failure or apoplexy.

Why is the cigarette more injurious than the pipe or cigar? Because the smoke is inhaled or drawn into the lungs. By being brought in contact with an extensive area of lung surface the poisons are absorbed in much larger quantities than when merely brought in contact with the mucous membrane of the mouth, and naturally the injury sustained is greater. Some abandon the cigarette and take up the pipe or cigar, thinking they are making a partial reform, but having acquired the habit of smoke inhalation they continue to inhale the smoke as aforetime. The inhalation of the smoke of the cigar or pipe is almost as injurious as is the inhalation of the smoke of the cigarette.

Smoke inhalation is quite a recent practice in the United States. Fifty years ago cigarettes were practically unknown in this country, and smoke inhalation was seldom witnessed.

Last year there were consumed in the United States about fifteen billions of manufactured cigarettes, bringing in revenue alone to our government the sum of nearly eighteen million dollars, and a net profit to the manufacturers of over thirty-five million dollars. There were twice as many more hand-rolled and imported cigarettes smoked. The total cigarette consumption for the year, therefore, did not fall short of forty billions, or an estimate annual average of twelve hundred cigarettes for every male inhabitant in the United States over ten years of age. Some kind of an idea may be obtained of how rapidly the cigarette is replacing other forms of tobacco in use, when I say that during the past ten years the sale of cigars has increased  $8\frac{1}{3}$  per cent. while the sale of manufactured cigarettes has increased over 400 per cent. The cigarette is crowding out the pipe and cigar, and in the near future cigarette smoking will be almost universal, unless measures are taken to arrest its spread. The alarming thing about it is that American boys not yet in their teens are fast becoming cigarette addicts. This is a serious matter, since the practice so profoundly retards the physical, mental, and moral development of boys.

The cigarette has products added to it which in the process of combustion develop poisons even more injurious than nicotine. One of these is known as furfural. Each manufacturer has his own secret process of making cigarettes. Just what each brand contains it is difficult at present definitely to state, but we are not nearly so much concerned in what the cigarette is made of as we are in what it makes of our boys. In referring to the change that had taken place in her boy, one mother in writing for advice says, "He was as fine and bright a boy as one could meet until he commenced this habit. It seemed to change his entire disposition. He could not study or read; he gave up his music in which he had always been interested. He is sullen and ill-tempered to the point of desperation. He will go without clothes to purchase tobacco, and as he is my only boy and I had hoped much for him, I felt I could not give him up. This and this only is my excuse for troubling you. I am

and have been for years on the lookout for something or someone to help me. My prayers, though constant, seem to do no good, and in the meantime the years go by and he is wrecking his young life as well as mine."

In some of our public schools from 50 to 75 per cent. of the boys over eleven years of age smoke cigarettes. In one school I found 90 per cent. of the boys had formed the habit. Most of the truancy, carelessness, poor school work, bad conduct, come from these youthful smokers.

The cigarette boy is impaired mentally and is perverted. He does not appreciate the right of others. These are the boys who are suspended and finally expelled from school. These make necessary our juvenile courts. In our business colleges young women are found greatly in excess of young men, and in our offices where accuracy, speed, and efficiency are required, young women are in demand. The cigarette boy feels more at home in the moving picture show, pool room, or saloon.

The cigarette naturally leads to the juvenile court, the reform school, and penitentiary. Not less than 95 per cent. of our youthful criminals are cigarette smokers.

Tobacco exerts a blighting influence upon the germ plasm; thus the smoker mars the future efficiency of his progeny. The son of the non-smoker, other things being equal, has a better heredity, physically, mentally, and morally, than has the son of the smoker.

The practice is on the increase among women. Cigarette smoking among society women of European countries is alarmingly common, and some time ago the statement was made by a noted society woman of Boston, "Everyone smokes cigarettes nowadays outside of a very conservative circle. It is just as natural for a young woman to smoke as it is for her to take a cup of coffee."

A well-known American authoress said: "Surely you'll not be surprised to learn that at houses where I am entertained in New York and San Francisco, cigarettes are passed to the women with their coffee as a matter of course. And wherever women have become frank and have lost their little hypercritical nerves, you find them smoking."

Women with their higher and more sensitive nervous organization will take to the soothing influence of the cigarette more readily than the men when once public prejudice subsides.

It is possible to wipe out this practice.

Smoke inhalation had its origin with the American savages.

When first introduced into Spain, tobacco was cultivated purely for medicinal purposes, and from there was shipped to England, France, Germany, and other countries. In England during the seventeenth century, its use became so common that it was employed by "both sexes, by all ages, and classes, under all circumstances, and in all places." It is said that he who refused to smoke at the social functions was considered "peevish and unsociable." One writer compared its spread to Elias' cloud which, "though at first no bigger than a man's hand, suddenly covered the face of the earth."

Even ministers, it seems, had become confirmed slaves to the weed. In 1697 one writer said: "Though tobacco be an heathenish weed, it is a great help to Christian meditation, which is the reason, I suppose, that recommends it to your parsons, the gen-



erality of whom can no more write a sermon without a pipe in their mouths than a concordance in their hands."

The evils resulting from its use became so apparent in England that it was decreed that smoking must cease.

Restrictive measures were enforced. In the year 1693 it was enacted by the House of Commons that no member was "to take tobacco into the gallery or to the table sitting at committees." Educational and legislative efforts continued side by side until the apparently impossible was accomplished, for by the year 1763 one writer said, "It is unusual in England or Scotland for a gentleman of politeness to call for a pipe." And ten years later, or in the year 1773, Dr. Johnson declared, "Smoking has gone out." The habit was at this time discredited and repudiated both socially and morally. It was in fact, we are informed, considered "vulgar to smoke." For nearly a century this continued. At the beginning of the reign of Queen Victoria, to smoke on the street was still considered a *vicious thing*. It is said that a man seen with pipe in the mouth on the streets of London "was considered irretrievably bad." This demonstrates what may be accomplished by a united effort.

It was not until after the Crimean War that smoking again appeared in England. The English officers and soldiers being brought in contact with the Spaniards and Turks who were users of the cigarettes, acquired the habit, and on their return we are told "the gilded youths and men about town copied the manners of the heroes of the day, both by smoking and cultivating beards."

Cigarette smoking and smoke inhalation have again become almost universal in England. It is possibly England's *greatest* curse to-day. Her young men are stunted and unfit for army service as a result of this practice.

Sir Brampton Gordon recently in his speech on the finance bill said: "The evil effect of the growing habit among boys of smoking filthy cigarettes could scarcely be exaggerated. Without doubt it was a habit which left the rising generation deteriorated in physique, and the result of such indulgence could be found in the miserable failure of the Spanish forces in their war with the United States, the superiority of the German over the French soldiers, and even in the Transvaal war there could be found the effects of this pernicious habit. If ten or fifteen years hence we should have the misfortune to engage in war, this habit among our youth of to-day would tell against us."

America is a great nation and Americans are fully conscious of it. America's greatness may be chiefly attributed to the start she received from the splendid men and women who first landed in the New England States, all of whom were haters of tobacco. Hutton described a Puritan of that day as one who "abhors a satin suit, a velvet cloak, and says tobacco is the devil's smoke." There are men still living who are able to recall the days when smoking on the streets of the eastern cities or in public places was punishable as a crime. America gave birth to some of the world's greatest men at that time. But America is not securely great. She is great only in proportion as she can make sure of having great and good men in the future, and the future of this country is stored up in the boys of the present. To sanction by law, an evil which will ruin her boys physically, intellectually, and morally spells ruin to America as a nation.



Physical and moral degeneracy is marked in every country where the use of tobacco has become general among the people. The Indians among whom smoking had its origin are about exterminated. Spain is degenerate. Her trade in tobacco, it is said, in those early days proved more profitable than her gold mines of India. She was then possibly the most powerful and influential nation on the earth possessing the largest and richest colonies. Spain has fallen from her coveted position. One by one her colonies have been taken from her. She has been deprived practically of all her American possessions including Cuba, the island on which this practice was first discovered by her. In the United States we are receiving an annual revenue of over one hundred million dollars from the traffic in tobacco. This is no real asset—the real asset is the boy. We can not afford to repeat the history of past nations. Like them, we may say, "I sit a queen and shall see no sorrow" at the very time when our foundations are crumbling and the handwriting on the walls of our legislative halls, reform schools, penitentiaries, and insane asylums unmistakably declare the ruin of the nation.

# CORRESPONDENCE.

RICHMOND, VA.

EDITOR, INTERSTATE MEDICAL JOURNAL,

Dear Sir:—The article by Dr. Benj. F. Davis entitled "Treatment of Devascularized Intestine," in the May issue of the INTERSTATE MEDICAL JOURNAL is exceedingly interesting. The conclusions in the main agree with those that were reached as a result of some experimental work by my former assistant, Dr. C. C. Coleman, and me. We felt that short segments of intestine no longer than two inches, which was the length of segment employed in most of our experiments, could, when separated from the mesentery, be left with a considerable degree of safety. The longer the segment the greater the danger and we would not, under any condition, advise this treatment for segments of more than five inches in length.

Dr. Davis has, however, made a few criticisms that I wish to discuss. First, he thinks it was an error on our part to disregard the large recurrent vessel from the cecum. As is well known to everyone who does experimental work on intestines of dogs, a large artery runs from the cecum onto the ileum for several inches in somewhat the same location in which we find the ileocecal fold in man; that is, on the convex surface of the last few inches of the ileum opposite the mesentery. We used, for experimental purposes, the lower portion of the ileum. Unfortunately, I have no notes of the exact distance of the devascularized segment from the ileocecal valve, but I am reasonably sure that in most cases, if not in all, it was out of the region that could be supplied by this large recurrent artery. I can make this statement because the segment was so placed that several inches of unaffected intestine on each side of the loop that was devascularized could be removed along with the specimen. In some instances this redundant amount of intestine was cut away after the specimen was removed in order to put the specimen easily into the flat glass jars we used as containers. In addition to this, however, Dr. Davis does not mention the fact that in five of the twelve experiments tapes were placed at each end of the devascularized segment and tied sufficiently tight to occlude the bowel at both ends though not tight enough to injure the intestine. I believe these tapes were tight enough to cut off the circulation in practically every case; so the segment of bowel between the two tapes could not have been nourished by vessels from the adjoining portion of intestine.

The second criticism of Dr. Davis is, "wrapping omentum about devascularized bowel appears to influence the final result but little." Our work on devascularization of the intestine was first read before the Section on Pathology and Physiology of the A. M. A. at Atlantic City in June, 1912, when ten experiments, five with tapes and five without tapes, were reported. The specimens from most of the experiments were exhibited. Photographs were made of many of these specimens and submitted for publication with the paper (*Jour. A. M. A.*, August 24th, 1912), but the editor did not think the photographs were essential. We did two further experiments and read a paper reporting the whole twelve experiments and showing most of the specimens before the meeting of the American Surgical and Gynecological Society of 1912. This paper was published in the *Annals of Surgery*, April, 1913, and the editor of the *Annals* also refused to publish the photographs, as he thought they were not essential. However, in the article as it appears in the Transactions of the Southern Surgical Society for 1912 there are two illustrations, reproductions of the photographs of specimens which I think would have some bearing on Dr. Davis' criticism. It would be difficult to explain how two dogs lived thirteen and fourteen days, respectively, after devascularization of the intestine with the application of tapes at the end of the segment, if the omentum did not convey nutrition. The photograph of one of these dogs, No. 5, shows the devascularized section of the bowel apparently well nourished with its coats distinct and apparently healthy and the occluding tapes still in position. In the *Jour. A. M. A.* for August 23rd, 1913, I have a paper entitled "Experimental Transplantation of Intestine After Extensive Excision of the Sigmoid." In this paper are reported three experiments which seem to throw some light on this subject. In the first, about four and one-half inches of ileum were removed and then sutured in position, and was surrounded by omentum. The dog died in twenty-four hours with the segment completely gangrenous. In the next operation

a segment of about four inches of ileum was transplanted in a similar manner between the stumps of the resected portion of the sigmoid, except that the mesentery of the segment of ileum was left attached until after the ileum had been sutured in position and then the mesentery was cut and the segment surrounded with omentum. In another dog a segment of ileum was similarly transplanted and its mesentery left permanently attached. Here only two inches of ileum were used. In the experiment in which four inches of ileum were transplanted and the mesentery severed after the suturing had been completed and the omentum wrapped around the segment, the dog died after nine days. The post-mortem showed that, while most of the transplanted bowel had lived, there were perforations in several places causing peritonitis and death. When the shorter segment of two inches was transplanted and the mesentery left attached, the dog only lived four days and the post-mortem showed a condition similar to that in the second experiment in which four inches had been transplanted and was apparently nourished chiefly, if not solely, by the omentum.

One of the dangers from conservative treatment is obstruction which results from adhesions of the omentum to the devascularized segment. This danger, however, may not be entirely obviated by neglecting to fasten the omentum in this position, for in the first series of Dr. Davis' experiments, which were done closer to the rectum than ours, he mentions in the post-mortem of the typical case that the omentum was adherent to the segment at several points beside adhesions between the terminal loop and the ileum. This condition would certainly be not more free from the dangers of obstruction than the condition which would result when the omentum was sutured around the segment and became firmly adherent. In this latter instance, adhesions of the omentum to the bowel would be the chief, if not the only adhesions, and the danger of having additional adhesions between the loops of ileum, as mentioned in Dr. Davis' experiments, would be obviated.

It would be difficult for many abdominal surgeons to agree with the criticism of Dr. Davis that the omentum is of but little if any value in nourishing tissue to which it adheres when there is no inflammation. It is not a very rare experience to find very large and vascular adhesions of the omentum to a fibroid tumor of the uterus or an ovarian cyst whose pedicle has been twisted. Occasionally such a condition will be seen in which all or most of the blood supply to a tumor of this type seems to be conveyed through the omentum. We do not, of course, claim that the omentum can at once take up the nourishment of any segment of bowel which has been suddenly deprived of its nutrition through the mesentery, but that it can aid in the nourishment of short segments which have been quickly devascularized seems to be the logical conclusion from the experimental work which has been mentioned. It is probable that the lymph itself conveys some nutrition before the blood-vessels can be thoroughly established.

Clinically if a patient can stand the extra length of time and if the operator feels reasonably sure of his technique in resection, it would be safer to resect a devascularized segment of bowel; but, if the patient is shocked and in bad condition and if the operator is not sure of his technique of resection and if the segment is a short one, it would probably be better to treat the case conservatively. In the experiments mentioned, the omentum was wrapped around the devascularized segment in order to be sure that nutrition did not come from the separated mesentery. Clinically it would be better to utilize both these sources; the mesentery should be sutured to the border of the bowel from which it was separated and the omentum also fastened by a few sutures around the free surface of devascularized segment.

Yours truly,

J. SHELTON HORSLEY.

May 27th, 1916.



## BOOK REVIEWS.

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A TEXTBOOK UPON THE PATHOGENIC BACTERIA AND PROTOZOA. For Students of Medicine and Physicians. By Joseph McFarland, M. D., Ac. D., Professor of Pathology and Bacteriology in the Medico-Chirurgical College, Philadelphia, etc. etc. Eighth Edition, Revised with 323 Illustrations; A Number in Colors. Philadelphia: W. B. Saunders Company. 1916. Price, \$4.00.

When a book reaches its eighth edition, it would appear that it does not require a very lengthy introduction to the public. Since this book of McFarland's claims only to be a textbook, and especially a textbook for students of medicine, it is from that point of view that we should consider it. It is interesting to note that the book has been largely rewritten and that considerable material has been added, and this, in spite of the fact that the last edition was published only three years ago. It is true that this revision was necessary, since there were many omissions in the earlier edition, and in many places the author had failed to keep his text up to the more recent advances.

The book in its present form is abreast of the times, and it represents an excellent presentation of our present-day knowledge of pathogenic organisms. There has been a marked strengthening of that portion of the work which deals with immunity and the various immune reactions, a portion which most needed revision.

Like most works on bacteriology prepared for students, the section dealing with the biology of micro-organisms is too brief. It may, of course, be pleaded that the book is essentially one on 'pathogenic' bacteria and protozoa; but it scarcely seems possible to attempt to teach or write even upon this limited field of bacteriology without having first laid a firm basis of the necessary fundamental knowledge. This, however, is a fault common to all textbooks on this subject.

There are two things especially worthy of commendation in this book. The illustrations are practically all of superior quality; the newer ones have been kept to the standard of those in the earlier editions. The second point is one which is rarely given any attention in textbooks published in this country, and yet is one that should receive attention whether the book be prepared for students or for physicians. McFarland's is one of the few books which gives any references to the literature quoted in the text; this feature—and it is an excellent feature—is not new in this edition, however.

The arrangement of the order in which the various organisms are considered is similar to that of the earlier editions and it can hardly be said that it is such as to facilitate one's locating the different bacteria or protozoa in the book. The text as revised maintains the clearness of presentation which was evident in the earlier editions.

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## EDITORIAL.

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### THE ENGLISH OF MEDICAL WRITINGS.

We had been talking for some time. He was a well-known practitioner and I was not so well known; but I had one distinct advantage over him as I had attended the meeting of the American Medical Association at Detroit and he had not. He seemed to be mildly interested in my conversation; and when I told him about the men I had met, there was a slight increase in his interest. But not until I mentioned the glories of the meals did his scientific spirit become rampant. Finally he queried: "Who were you with?"

Now what this doctor said to me was indeed ungrammatical and quite disturbing to ears accustomed to correct speech. Perhaps he knew that his utterance was not invulnerable, and that I had been quite as careless as he on many occasions, and would pay small heed to his lapse from what has been accepted as the correct way of speaking when one civilized man exchanges ideas with another. But when the catapult loaded with 'Who were you with' assaulted my ears, I was supersensitive to the sound, for I had just read a letter from Dr. Charles A. Mercier in the *British Medical Journal* of May 20th, in which the writer held forth with considerable acrimony on the way medical men write English, and how deplorable it is that they use the word 'marked' to an exasperating degree, and are not above saying, 'He was given a pill.' That the word 'marked' has been a 'marked' characteristic of medical writings, cannot be gainsaid; for anyone may come across this precious word a half-dozen times in the course of a three-page article, when the author wishes to convey the idea that something occurred in the course of a disease that was momentous enough to enlist his attention. As Dr. Mercier says: "It is used, as far as one can judge, as common form for decided, pronounced, evident, clear, unmistakable, unquestionable, perceptible, tangible, visible, slight, considerable, great, copious, abundant, actual, scanty, prevalent, scattered, occasional, and many more." This is surely a formidable list, and goes to show beyond a doubt that doctors are not

fickle but are constant to one word, and that when it is a matter of using the same word to express a thought that ranges from 'decided' to 'scanty' they are supreme artists.

As regards 'He was given a pill,' what doctor, though never guilty of having said, 'Who were you with,' has not repeatedly said and written this phrase in his medical papers? Of course, just because he has used it without so much as setting the inquiry in action in his mind, as to whether it was right or wrong, does not justify its usage nor proclaim it a fair flower in the accepted garden of grammatical phrases. But though Dr. Mercier is pitiless in his criticism of this phrase, and though as a grammarian his authority is undoubtedly high, the writer of these lines must accuse him of knowing his grammar better than he knows human nature. Now it is a fact that when a doctor sits him down to write an article, what is uppermost in his mind is how successful he was in combating the special disease with which his patient was afflicted; and whilst writing he visualizes the patient under various trying circumstances and also under the benign effects of a convalescence. He sees him groaning, moaning; perhaps he recalls some instances when the patient relieved his tortured mind by swearing; and he sees, greatly to his own satisfaction, the result of administering a pill, a powder, or a liquid. Therefore the patient is always alongside him, so to speak, when he drives his pen across the foolscap, and therefore in writing about a pill or any other form of medicine, enamored though he be of the deep insight which prompted him to give the right medicine at the right time and how he of all doctors was the one being to recognize the hidden virtues of a certain drug, the patient invariably has precedence. As was said before, this is human nature, and though the charge may be made against him that he is careless of grammar, is it not far better that he should be a sympathetic human than a dry grammarian? Hence we get, 'He was given a pill,' in his writings, and not, 'A pill was given to him,' as Dr Mercier would wish.

The matter of medical English is a chapter that sometimes depresses the reader and sometimes elates him. When he is depressed, the feeling is due to comparisons made between medical writings and the prose by English masters of the art of writing. But the reader's elation occurs just as often as his depression, for the reason that the vast majority of medical readers are not bothering their heads about literary style or grammar. If they affect the former or are meticulous about the latter, they generally make a sorry mess of it, for their ideals are founded on some story in the *Saturday Evening Post* or the *Cosmopolitan Magazine*. Yes, indeed, the phrase 'He was given a pill' is a melodrama in grammar; but how engaging and jolly it is alongside, 'Who were you with,' the veritable and almost daily tragedy of medical speech. P. S.



## BOOKS AND AUTHORS.

Perhaps it has been your duty to wade through a large number of books on the history of medicine and perhaps it has not been your duty; but it may have been that an older man than you has said to you, not once but many times, that you ought to know something of the elect in medicine who have done a great deal to make your profession one of abiding fame. With this suggestion in mind, no doubt you read a number of books, and yawned a great deal and perhaps swore not at all in a minor key. And you voted the history of medicine a very dull affair, and fully agreed with Charles Dickens that it was a waste of time to burrow in the graves of dead authors, or rather languages, as Dickens really put it. Then you ceased your labors and took all your future food on this very interesting subject from the titbits in the medical press and also in the daily press. But though prejudiced, and rightly so, against the dryasdust books that are generally recommended to the novice when he is told to read up on the history of medicine, we would go counter to this prejudice by recommending a book that has so many fascinations, that even the most unenthusiastic reader of books on the history of medicine must warm to its many lures. Reference is here made to Dr. William Macmichael's "The Gold-Headed Cane," which was originally published in 1827, but is now given a new dress by Paul B. Hoeber, of New York, though the dress is not so new as one might at first infer, since the present edition is a replica of the second edition published 1828.

The Gold-Headed Cane tells the story, and a most interesting one it is, of the ups and downs of all those who carried it—Radcliffe, Mead, Askew, Pitcairn and Baillie. A shrewd and clever observer is this cane, with the acumen and wit and perspicacity of Pepys himself! It followed the fortunes of all the men who held it; it criticized where criticism was necessary; it praised where praise should be forthcoming. In short, it was a born chronicler of small beer of the best sort; not a gossip, by any means, but so enamored of details that it proved to be a much better and more reliable historian than are those writers who have written of the same period in a graver and more laborious manner. Washington Irving, in one of his charming essays, says that he never understood how so many histories could be written until he visited the British Museum, when he saw innumerable men scribbling on blocks of paper from tomes long-forgotten and supposed by the public buried beyond recall. Not this the manner of the Gold-Headed Cane in search of historical data; it was too clever to waste its precious moments among dusty books, and therefore neglect the passing show. It was too near the hands of the doctors who carried it not to know what was going on in their hearts. And a bright, delightful anecdotal history was the result, not only of the doctors themselves, but of all the great and small in a social sense who were of the web and woof that made up the cloth of the town and country life in England in the seventeenth and eighteenth centuries. Of solemn histories much has been written in praise; but of books of the sort of which the Gold-Headed Cane is an excellent example much more should be written, for it is the anecdotal history that brings us in close touch with the inner lives of men and women who were human enough to have our faults and great enough to make the reader overlook their defects.

P. S.

In a recent essay by Havelock Ellis, entitled "Morality in War" (*The Nation*, London), the author contends that since the word 'morals' really means *mores*, the custom of a people, "the expanding bullets and poison gases, the poisoning of wells, the abuse of the Red Cross and the White Flag, the destruction of churches and works of art, the infliction of cruel penalties on civilians who have not taken up arms" are not indicative of a low moral standard, but are indicative of a continuation of what war has been across the ages—"a relapse from civilization into barbarism, if not savagery" plus "scientific barbarism." In short, if it is the *mores*, the custom of a country, to heave brickbats on the slightest provocation or drop bombs from aeroplanes on innocent passers-by where the provocation is remote from the real battle-field, the act is a moral one, since it conforms with the custom of the people who are abetting it, and would be an unmoral one if done in any other way. Those, who are completely wrapped up in 'scientific barbarism' and who can see no other but a high moral standard in the 'Chemical War' that is at present disgracing European civilization, should read Havelock Ellis's essay with care and with the painstaking effort that will yield them many quotations for future conversations; but, on the other hand, there may be many others who cannot at all agree with Ellis, and to those the reviewer would commend a very interesting but 'unscientific' book—"Roadside Glimpses of the Great War" by Arthur Sweetser (The Macmillan Company, New York). A humane book is Mr. Sweetser's, and an honest one too, for he got his impressions at first hand and he saw and judged as any 'unscientific' man of intelligence would have done. The torn flesh, the broken limbs, the trampled bodies in hundreds, the horrors and amazements of our so-called civilization, did not send him into dark corners to weep for the loss of a beautiful ideal that he had always cherished in connection with the love of one man for another, but made him jot down such thoughts as the following: "And always men torn, cut, ripped open in that recrudescence of their primitive savagery . . . They came the first wounded, limping, struggling, straggling along like spectres through the quiet road. One hopped along painfully on one foot, the other foot dangling as if unstrung . . . Modern battle is the cold, calculating work of science, largely shorn of the human element. Men mechanically load and unload artillery, firing in cold blood without enthusiasm, even without knowledge of results, at other men who die without knowledge of whence came the fatal missiles. The rifle has become as useful as a toothpick; there is no defence against shrapnel; it is simply a case of whether it gets you or the man beside you."

After reading the preceding lines, can one in his right senses agree with Havelock Ellis in his pronouncement that war is moral?

P. S.

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No matter how busy you have been in these days trying to collect enough money to tide you over until winter, or how engrossed you have been in your scientific studies, some wight, no doubt, has insisted upon your reading a bit of 'free verse,'—that form of poetry that seems to be decidedly in the air at present, in fact, has made the otherwise clear air heavy and murky. No doubt this



same wight has thrust under your nose Carl Sandberg's "Chicago Poems," or some of the outpourings of Amy Lowell's poetic Muse, or something or other written by that supreme Vorticist, Ezra Pound; or perhaps your wife,—and of all wives doctors' wives click their heels most often at literary societies, so great is their desire to get in touch with what is modern so that they can modernize their rather old-fashioned husbands who still persist in regarding "Ivanhoe" a great novel,—has brought to your notice the importance of this new movement in the world of poetry and has instructed you in the hidden meanings of some of the most obscure poems. But allow the writer of these lines to hasten to your rescue with the assurance that all poetry written to-day is not of the order you or your wife may think, but of an altogether different order, and so much better and so much more exalted and instructive, that to turn a deaf ear to it would be a declaration that your ear is attuned only to the monstrosities and perversions in modern literature. To prove the truth of this assertion, all that is necessary is to read Joyce Kilmer's "Trees and Other Poems" (George H. Doran Company, New York). In the slender volume before us are thirty-one poems, and each one is done by the hand of one who has dwelt in the pure air of a well-ventilated room, who has concerned himself only with the sanities of life, who has mastered his Muse so thoroughly, that when he wishes to express himself he finds it unnecessary to resort to the verbal involvements and the topsyturvyism which undoubtedly are the hall-mark of the verse 'manufactured' by many poetasters to-day. The poem "Trees" is so unusual in its exquisite cadences that it must be mentioned in preference to any other; but this does not mean that the other poems are not worth while, for that would be stating an untruth, since they all show that only a mind, that was capable of producing the masterpiece mentioned, could have written them. And to Joyce Kilmer our praise should go, for he is the only American poet writing to-day who has the felicity of phrase, the directness of thought, the beauty and loftiness of a moral ideal that makes the reading of poetry a joy,—creates, in fact, the feeling one gets from reading Keats or Heine's "Book of Songs."

P. S.

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Every physician has made a number of 'trips' to graveyards, not because he wanted to be reminded of his buried mistakes, but because being an entity either with a family or friends, or both, he was on certain sorrowful occasions compelled to do so. And it may have been while waiting for the dead to be lowered into the grave that he cast his eyes about and read the nearby epitaphs. Some no doubt interested him; some no doubt amused him, especially those which recorded the death of a dearly beloved husband when he knew the wife had no love for her husband but gave all her affection to another man, or the death of a dearly beloved wife whose husband was known to the physician to be untrue to his marriage vows,—a rake and the carrier of certain 'social germs' which blighted the health of his children. Now this is exactly what Edgar Lee Masters attempts to do in his much-discussed and widely-read "Spoon River Anthology" (The Macmillan Company, New York), only he was wiser than the physician we have in mind, for he put



his thoughts on paper in a form that he calls poetry, but which is not poetry as we understand it to-day from what Masfield has given us, or Rupert Brooke, or Alfred Noyes, or Stephen Phillips, though it must be admitted that occasionally he gives evidence of having caught the elusive poetic Muse. The graveyard which yielded so much material for this book was a village graveyard, and under the sod lay those who had led a drab existence, those who had lied and cheated, those who had sinned and none, in fact, who had been happy. Perhaps this is life in an American village; but how drab the whole thing is, how grewsome, how doleful! Not since Zola wrote "*La Terre*" and showed the world the bestial immorality of country life has there been a book filled with so many startling immoralities about country folk as is this one. The real stories of their lives are told us in all their nauseating details, and we are taken to their homes to see what really occurred and are inducted into that inner life of sexuality which is made much of because of its grossness and irregularities. If the reader wants to learn what is to-day thought to be realism, let him read this book, for in it he will note the progress of the harlot, the progress of the thief, the progress of the cheat and liar. Perhaps all that is related is true; it may be; but even granting this, why try to interest a world, that wants to be optimistic, in the narrow, selfish, heartless, commonplace and vulgar existences in a village? And why dwell on Lesbian love, syphilis, and the nastiness of a young wife killing her old husband by means of her sexual passion so that she can marry another, whom she deems her equal in a sexual sense?

P. S.

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No doubt you have read quite a number of books on the Great War and have learned a number of things that have prejudiced you for or against one or another of the warring countries. Perhaps it has been your lot, just as it has been the lot of the writer of these lines, to read consecutively the literary (?) outpourings of a newspaper correspondent who never was at the front, but whose knowledge of military tactics was gleaned from the conversation which circled around his boarding-house table. But it may have been that, being a close student of the world events which are now making, you have burdened your mind with the opinions—again in book form—of what some military expert had to say, or some captain, or some colonel. No matter what snags you have struck in your keen desire to know thoroughly the ever-shifting scenes which are happening to-day, or why the nations, whose armies are being decimated one minute, number hundreds of thousands the next, or why the nations who are starving at this very hour are really not starving but are living in a land of plenty, there may be some books which you have not read—some books which do not deal with the intricate questions you have failed to see solved, but which, nevertheless, have so human a note, so many unprejudiced observations and so much 'plain writing' that to overlook them would necessarily leave a wide lacuna in the education which no doubt you desire. Such a book is Edward D. Toland's "*The Aftermath of Battle*" (The Macmillan Company, New York), for on every page one may find a thought that is the author's own and a clear-cut

photograph of what came directly under his eyes in those early days of the Great War when the hospital conditions in Paris had not reached the perfections which they have to-day. A bank clerk when the war broke out, the 'urge' for doing something to help the French seized him, and hurriedly he left Philadelphia, traveling in the steerage. When he arrived in Paris he was only an ignorant man who had never 'helped' in a hospital, but his desire to be of some 'good' was too keen to allow his inexperience to stand in his way. And he soon got a 'job,' nay, quite a number of 'jobs,' and what he saw he jotted down in the natural way a clever tyro always does, without any thought to literary values or self-importance. A charming book was the result; and if the medical man wants to know a true story told in unvarnished but forceful English of what the harrowing scenes were like in the hospitals of Paris in September and October, 1914, there is no better source of information than the book so incompletely described here.

P. S.

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A book that should command attention from the students of the peculiar customs which obtain in various parts of this country is "Mary at the Farm," by Edith M. Thomas (published by the author, Quakertown, Pa.). In the volume before us a story of the domestic life of the 'Pennsylvania Germans' is told with the quaint and charming details with which the authoress of "Tillie: A Mennonite Maid," has made us familiar in her tale of the joys and sorrows among these people, and with which Mary E. Wilkins has done similar service on behalf of the New England folk. But, unlike the writers we have mentioned, Mrs. Thomas is less a novelist than a historian; and whether she describes the odd mantel or table ornaments which have survived to this day, or the furniture or the cooking, she does so in the spirit of the chronicler who knows whereof he speaks and is of such sincerity and probity that to doubt him would indicate a captious spirit. The psychology of the 'Pennsylvania Germans,' who have retained through generations the marks which made their ancestors a thing apart from the 'real Americans,' who thought this country was only meant for material aggrandizement and for making them socially and educationally prominent in the shortest possible time, is laid bare; and praise should go out to the authoress for accomplishing this difficult task with a simplicity and a sincerity that takes no account of the involvements of modern psychology, so unnecessarily tedious in those books of to-day that make a bid for the reader's consideration on account of a learned exposition of this peculiar phase of thought in the understandingness of men and women. Bucks County, Pennsylvania, has many corners and crannies of exceptional interest; and even though the reader may not be a descendant of the 'Pennsylvania Germans,' he must be a laggard student and a very indifferent one if Mrs. Thomas' book does not hold his attention long enough to make him cognizant of a part of the country that has as much interest, from a historical point of view, as has Louisiana, Virginia or any other state whose early customs have not been completely swamped in the onrush of a rampant Americanism.

P. S.

There are those close students of Masefield's writings who prefer his poetry to his prose, and even the writer of these lines, thorough Masefieldian though he be and avid of everything the distinguished Englishman writes, is at times so enthusiastic of his poetry that he overlooks the sterling qualities of the prose this modern weaver of English words has given to the world. In "The Tragedy of Nan" (The Macmillan Company, New York), we find Masefield at his best as a dramatist, for in it he has put the nobility of thought with which all readers of the Masefield literature are familiar. A sordid story, indeed, is that of the heroine of this play: a sorry tale of family bickerings, of petty jealousies, of the grinding and demeaning effects of constant attrition with the unsympathetic, the small and ugly-minded of the world, who cheat and lie and misinterpret every act of others to gain their own ends. Into an atmosphere of gloom and sordidness the author thrusts his heroine, not for the sake of increasing the reader's pessimism, but rather to show by contrast the meanness and contemptibleness of the provincial mind when brought in contact with the purity of thought and the naturalness of motives as illustrated in the heroine. Medical men who are wont to diagnose 'nervous troubles' only as the science of medicine has ordained they should, would do well to read this very human document, for by the correct reading of the lines they will learn much that will enlighten them in regard to why 'nervous troubles' occur in certain households where joy is crushed by constant re-criminations and false and unjust accusations. The publishers have done a kindly act by republishing this masterly prose-poem; and grateful, indeed, is the writer of these lines, for in rereading it he was again reminded of the 'sense' of modern literature that was revealed to him when he saw Miss Horniman's Manchester Players in this play some years ago.

P. S.



## ORIGINAL ARTICLES.

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### TREATMENT OF FRACTURED MANDIBLE ACCOMPANYING GUNSHOT WOUNDS.

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The object of the present article is to call attention to some new methods of treating fractures of the mandible resulting from gunshot injuries, the more so since very few if any of the methods described in textbooks are suitable for treating the majority of injuries of this nature occurring in the present war.

A fractured mandible caused by a gun shot is very different from the fractured mandible seen in ordinary civil practice. There is practically always an external wound or wounds, though in not a few cases the bullet seems to have entered through the mouth.

The fracture is always compound, and there is more or less loss of bone through comminution or actual carrying away of a portion of the mandible.

The result of such an injury is primarily (and most important) to exaggerate considerably the typical displacements which one is accustomed to see in civil practice. Bearing in mind that any splint or other remedial treatment should be designed to correct such displacements, it is necessary to recognize what these are likely to be. Fractures of the anterior portion of the jaw involving the incisor region lead to (1) a narrowing of the arch of the jaw; (2) twisting inwards of each horizontal ramus, this being brought about chiefly by the action of the mylohyoid muscle.

Fractures of the posterior portion of the mandible lead to (1) a considerable elevation of the posterior fragment (temporal and masseter muscles); (2) a retraction and deflection of the chin; (3) a depression of the larger fragment on the injured side. (2 and 3 are due to the unopposed actions of the genio-hyoid, genio-hyoglossus and mylohyoid muscles.)

As part of the conditions bearing upon treatment, it has to be remembered that many of the men have either (1) lost a large number of teeth or (2) have a number of septic teeth present, or

(3) were wearing dentures at the time of the injury which then disappeared.

These being the conditions it is necessary to select some method of treatment which will conform to them and which will reduce any future deformity or disability to a minimum.

In the first place let us review briefly the better known methods and splints and see in what way they fall short of requirements.

I. *The Four-Tailed Bandage*.—This is worse than useless, since it in all cases (except simple fractures) retracts the chin further, increases the displacement, and causes increased laceration of tissue. Furthermore, if tight it is very painful, and if loose it does not immobilize.

II. *Interdental Splints*.—There are general objections of a serious nature to all these. First, they require a plaster cast to be taken of the parts—a difficult and painful proceeding. Secondly, they require to be specially made for each individual case. Thirdly, for the above to be carried out, the services of trained specialists and special equipment of a cumbrous nature are required. Fourthly, the majority of such devices are unsuited to the nature of the injuries and do not control the displacements.

1. *The Hammond (wire) splint*, perhaps the best known of interdental splints, cannot control the marked upward displacement of the posterior fragment, nor does it prevent the inward tilting of fragments in anterior fractures. Moreover, its use necessitates a very large number of sound natural teeth being present.

2. *The Gunning splint* and its modification, the cradle splint, are unsuitable for posterior fractures. Their use may result in permanent 'open bite'; they are cumbersome and keep the mouth permanently propped open.

3. *The Kingsley splint* is perhaps the best form of interdental splint; it will effectively control all displacements, its sole objections being those attached to its having to be specially made for each case.

4. *The Ottolengui* and similar metal cap splints are unsuitable, owing to the tediousness of their manufacture for every individual case.

III. *Plate and Screws and Wiring*.—The former is, of course, inapplicable, owing to the sepsis and to the space frequently existing between the ends of the bone.

*Wiring* may be utilized with advantage in those cases when the loss of tissue has not been too great. But when there has been much loss of bone, to draw the two ends together and wire them would either be impossible or grotesque, and would not result in a jaw which could be utilized subsequently for mastication. This method may, however, be used in a modified manner as described below.

## IMMEDIATE METHODS OF TREATMENT SUGGESTED BY THE WRITER.

In view of the conditions of the injury and the disabilities pertaining to the usual methods of treatment outlined above, the writer has utilized the following methods and found them quite satisfactory.

I. *Splint*.—From what has been written above it might be inferred that the writer would not suggest the use of any form of splint, but in the one to be described it is believed all the enumerated objections have been overcome, with the added gain of extreme simplicity.

The splint advocated is a modification of the Kingsley splint. It has been adopted by the N. Z. Government (Defence Department) and supplies have been sent to the front for use chiefly on Hospital Ships.

The accompanying illustrations demonstrate the design and use of the splint. It is made of metal—nickel-silver, gilded—and consists of a body and two arms. The body is concave, and moulded to the shape of a dental arch. The arms are made of stout wire soldered to the body. The concavity is filled with old modelling composition. The splints are made in three sizes, small, medium, and large (Fig. 1). The following are the instructions sent out with each set of splints.

*The Pickerill Splint*.—This splint is a modification of the Kingsley splint for fractured mandibles. The modification provides a ready-made splint for any case, instead of a special dental splint having to be made to fit each individual case. It can be used for simple and compound fractures, and also in cases when a portion of the bone is missing, to maintain the relative position of the two fragments, and especially to counteract the upward displacement of the posterior fragment, which in such cases always renders any subsequent prosthetic operations difficult or impossible, and more or less incapacitates the patient for life. It can be removed and replaced without difficulty for dressing wounds. It requires no special technical skill for its adaption. It may be used advantageously in combination with wiring.

*Directions for Use*.—1. Splints are provided in 3 sizes—large, medium, and small. Select one which is of the approximate size required.

2. Remove the red composition by placing the splint in hot water.

3. Try the splint in the mouth over the teeth. If it is too deep at any point, trim it down with the scissors provided, leaving no sharp edges. Any other adaptations required may be made with the pliers provided.

4. Heat the composition in hot water and replace in the dried and warm splint. Whilst the composition is still warm, press the splint down into position over the teeth and jaw, observing (1)





Fig. 1.—Writer's modification of the Kingsley splint, showing concavity which is filled with modelling composition.



Fig. 2.—Illustration of method of adjusting the writer's splint to the mandible.



Fig. 3.—Intermaxillary lacing by wire ligatures round premolar teeth.

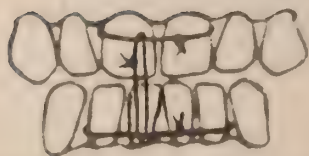


Fig. 4.—Temporary intermaxillary lacing in incisor region.

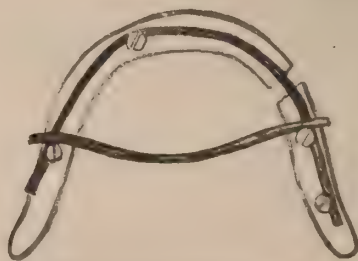


Fig. 5.—Submandibular wire splint and screws; shows also auxiliary transverse wire which may be necessary.

that the composition is not too hot or the subsequent removal of the splint may be difficult, and (2) that the fragments are in normal position.

5. Pass a bandage under the mandible up between each arm of the splint and the cheek, over the arm and down under the mandible, and there tie it firmly. The jaw is thus securely clamped (Fig. 2). A pair of pliers and a pair of small metal-scissors are sent with each batch of splints.

II. *Intermaxillary Lacing*.<sup>\*</sup>—This consists essentially in absolutely immobilizing the lower jaw by lacing it up to the upper jaw by means of wire ligatures around the teeth.

The following is the method used and described by the author (*British Med. Jour.*, p. 882). The ligatures should be of silver or copper gilt wire (gauge 21 or 20 B. W. G.), and the premolar teeth are the most suitable to which to affix them. These teeth are not so far back as to be inaccessible, and the comparative narrowness of their necks makes them useful for retaining the ligatures (Fig. 3). Two horizontal ligatures are first passed through the interdental spaces between the canine and first premolar, and the second premolar and first molar in both jaws, so as to include both premolar teeth. This should be done on both sides of the jaw. The horizontal ligatures on either side are then connected by vertical ligatures, all the wires being applied quite loosely.

The horizontal wires are next tightened, and then the lower teeth are made to articulate absolutely accurately with the upper teeth, and whilst in this position the vertical wires are tightened and the jaw thus immobilized. The method may be used as a temporary measure in all fractures of the mandible in which cases ligatures of silk or silkworm gut may be placed round the anterior teeth as shown in Fig. 4. This affords the patient much relief and is much more reliable than a four-tailed bandage.

The method may also be used as an adjunct to the open surgical methods of wiring the fragments, when fixation of the temporomaxillary joint may be desirable for a time at least. Even if all teeth are present, the patient does not suffer from inability to take sufficient nourishment. There is always sufficient space between the teeth and behind the last molars for liquid food to pass. Patients do not suffer very much from a diet of milk, porridge, arrowroot, soup, etc., for five or six weeks. In a similar way a patient can use an antiseptic mouth-wash and use the tongue as a toothbrush on the lingual surfaces of the teeth.

The vertical wire ligatures may be left on for three weeks, after which in some cases they may be removed and passive movements allowed; they may be replaced by silk ligatures, as being easier to apply. A vertical ligature should be continued until the sixth week,

<sup>\*</sup>See Author's "Stomatology," London, 1912.

especially during the time or times the patient sleeps, in order to prevent yawning, as the latter does far more harm than even a slight amount of mastication.

Another method of intermaxillary lacing is by means of Angle's bands. These bands are either made or procured and clamped to the teeth by means of a thread and nut. There are studs on the buccal surfaces round which ligatures are passed in order to bind the two jaws together.

*Absence of teeth* is no bar to intermaxillary lacing. When teeth are absent or so carious as to be useless for retention of ligatures, the writer proceeds as follows: (1) Holes are drilled through the jaw at the level of the roots of the teeth and about  $\frac{3}{4}$  in. away from the ends of each fracture line. Stout silver wire is then passed through the holes and the fragments approximated if possible. (2) Further holes are drilled in the region of the lateral incisors, or other suitable positions according to the site of the fracture of both upper and lower jaws, and a silver wire passed through both. The mandible is brought into the normal or desired position, and the wire tightened by twisting. The upper jaw is thus utilized quite satisfactorily for immobilizing the lower jaw.

III. *Submandibular Screws and Wire Splint*.—In cases where none of the other above-described methods are available for some reason associated with any particular case, such as an extremely septic mouth or the loss of much of the alvéolar processes, the following method may be adopted. A very stout piece of German silver (or even iron) wire is obtained and bent to the shape of the lower border of the mandible, as the latter should be normally, and extending from angle to angle. Four steel screws 1 or  $1\frac{1}{2}$  in. long and preferably nickel-plated are required and some fine silver or brass wire for ligatures. The skin under the mandible is sterilized and four small incisions are made directly over the lower border of the bone, two on each side of the fracture line (avoiding, of course, the facial arteries). Holes are bored in the bone for the reception of the screws, and the latter are then screwed in firmly for a depth of about half an inch. The stout wire splint is then ligatured securely to the four screws with the fine ligature wire and the mandible is securely clamped. Every effort should be made to prevent infection reaching the screws, or they may become loose before the fracture has united. It is an advantage to have the wire splint nicked frequently with a file near each screw to prevent the ligatures from slipping (Fig. 5).

IV. *Wiring*.—This method is desirable under two conditions: (1) When there is not much loss of tissue and the fragments can be reasonably approximated. (2) When there is an appreciable loss of bone and the fracture is so far back in the mandible that it is difficult or impossible to control the posterior fragment. A wire



may then be utilized not so much absolutely to approximate the two ends, but to prevent the posterior fragment being as much elevated as it otherwise would be. Thus the bar of fibro-cicatricial tissue is considerably shortened, there will be more power resulting in that side of the jaw, and the subsequent fitting of dentures may be done with less difficulty and with more chance of their being efficient and functional. For practically all fractures of the horizontal ramus the operation can be performed wholly from within the mouth. The difficulty, or otherwise, and success of the operation depend entirely upon the amount of swelling and sepsis present. Where this is marked and the method of treatment is deemed most suitable for the case, the author prefers to immobilize the jaw by temporary intermaxillary ligatures for some days or a week, whilst antiseptic mouth-washes are being used and the wound cleaning up. The method then employed is to drill through the bone between the roots of the teeth about  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch away from the fracture on either side, with a suitable drill. (For fractures in the premolar or molar region a contra-angle bandpiece is used in the engine.) In order to mark the site of the perforation, the drill is dipped in pure carbolic acid. Well gilded copper wire is then passed through the holes\* and tightened by twisting the ends, which are cut off and covered with either guttapercha or fine rubber tubing. It is then advisable wherever possible to supplement this single suture either by interdental or intermaxillary lacing in the neighborhood of the fracture.

The wire suture should be removed (by being cut) at the end of six weeks. This may require a general anesthetic, but it can usually be done under cocaine. This method has the advantage of being rapid, simple, and inexpensive.

*Precaution.*—Care should always be taken to clear out any comminuted fragments of bone from the wound at the time that the injury is treated by splints, wiring, or lacing; otherwise, of course, union will be prevented, or a sinus will continue discharging long after the soldier has returned to duty.

Treated by one of the above methods there is no reason why many men whom one sees at present more or less totally incapacitated, from a military point of view, should not be back in the firing line in six weeks from the date of injury.

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\*It is sometimes stated that there is considerable difficulty in returning the wire through the holes, but with a few commonsense precautions this is really a very simple matter.

SPUTUM CULTURES WITH SUBSEQUENT COMPLEMENT  
FIXATION CONTROL.

(From the Laboratory of the National Jewish Hospital for Consumptives.)

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By WM. WHITRIDGE WILLIAMS, M. D., of Denver,

AND

WARD BURDICK, M. D., of Denver.

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Most of us have an idea that the examination of sputum for micro-organisms other than the tubercle bacillus is an almost useless procedure. This idea is based on the assumption that the entire respiratory tract harbors a multitude of bacteria derived from the inspired air, which we know may contain very many. That the air may be germ laden is gathered from the reports of various workers who have found that in a given unit of air the number of organisms varies from 15 to 200,000, the latter in a dust storm. From these figures it can be calculated that one may inhale during every hour from 1,000 to 10,000,000 bacteria. With these numbers in mind it would seem our belief is justifiable that the respiratory tract is filled with germs of all kinds.

However, much experimental work, both on man and animals, has been done to prove the validity of the above thought, and we shall now quote from some of these investigations.

Everyone agrees that the mouth, pharynx and anterior portion of the nares, whether healthy or diseased, contain a vast number of organisms. In addition to air organisms there may be pathogenic microbes, notably pneumococci and streptococci. On the other hand, the posterior nares and the accessory sinuses of healthy individuals contain no bacteria. It has been proved that if a platinum loopful of *B. prodigiosus* be placed upon an area on the turbinates, in about one hour no living bacilli can be recovered from this spot. Similarly, cultures from the trachea and bronchi have yielded no growths when made under the proper precautions. Ritchie, who has done considerable work on the bacteriology of the respiratory tract, makes the following assertions:—

(a) All bacteria are probably withdrawn from the inspired air while it is passing through the upper air passages, the removal being mainly effected by the nasal mucous membrane and the adenoid tissue of the pharynx.

(b) The inspired air does not reach the alveoli.

(c) The expired air contains no bacteria.

(d) It has been shown experimentally that bacteria soon die when they are introduced into the trachea and bronchi.

(e) Direct bacteriological examination of the healthy air passages has in many instances shown them to be aseptic.

Accordingly, our preconceived notion that the respiratory tract is normally inhabited by numerous bacteria, similarly to the intestines, is proved to be incorrect. It is reasonable to accept the experimental evidence as well as some clinical observations and consider the entire tract below the glottis as sterile in normal persons. Therefore, if bacteria are found in an exudate formed in parts of the tract which are normally sterile, it is safe to assume that they are the etiologic factors of the inflammation which caused the exudate, provided, of course, that due care has been exercised that the exudate has not been contaminated by those portions of the tract which normally contain bacteria.

To demonstrate how much material, including bacteria, fungi, food particles, etc., may be obtained from the buccal cavity, one may set up a series of a dozen small beakers containing some water, then have the individual rinse the mouth successively with the contents of the beakers and note the sediment after centrifugalization. The first beaker will contain a large sediment, while the succeeding ones have a progressively diminishing amount until, in the sixth or seventh beaker, there is practically none.

Therefore, after careful investigation of the various sources of contamination of sputa, from which one is called upon to make cultures, we have been led to adopt the subjoined technique.

The patient brushes the teeth carefully, without tooth powder or paste, in front and back to loosen any food or other solid particles which may be adhering to the teeth or gums. Next he rinses the mouth thoroughly with twelve changes of sterile water followed by gargling the throat six times to wash out the pharyngeal vault and then six swallows of water to cleanse the lower part of the pharynx. After this he rinses the mouth six times. He now keeps the mouth closed and breathes through his nose until he is able to raise a specimen after a deep, hard cough. This sputum passes through a reasonably clean mouth and is deposited into a sterile container. We wish to emphasize that securing the specimen in this manner is an important step in obtaining proper cultures and in the subsequent making of an autogenous vaccine from the sputum. The amount of sputum raised at a single effort is usually sufficient. The sputum should be sent immediately to the laboratory; if this be impossible it should be placed upon ice, to prevent fermentation, until it can be.

The sputum is now placed in a washer designed for the purpose of releasing leucocytes, bacteria and other extraneous material which are held loosely enmeshed in the network of mucoid fibers



which form the framework of a given mass of sputum. The washer is so made that a small, though powerful, jet of sterile physiologic salt solution plays against the mass of sputum, causing considerable agitation and dissecting it finally to a small mass of mucoid fibers. This is the material from which the cultures are made. This end-product of the washing process, under the microscope, consists of transparent or translucent mucoid fibers, imbedded in which are seen the tubercle bacilli, if from a tuberculous individual, together with the germs causing the mixed infection. This material is removed from the washer by means of a large platinum loop and smeared over the surface of several freshly made human blood agar plates. As a rule, a pure culture is obtained, but when more than one germ grows, subcultures are made and they are then isolated and identified.

When it is desired to make a vaccine, the organisms are washed off the plates with physiologic salt solution containing 0.3 per cent. tricresol and placed in vials. They are then shaken in a mechanical vibrator until a homogeneous suspension is obtained. They are afterwards placed in an incubator at 37° C. for twenty-four hours, at the end of which time they are tested culturally for living bacteria. This method is sufficient to kill all pathogenic organisms recovered from sputum, thus avoiding the danger of injuring the delicate reactive substances contained in the bacterial bodies. The suspension is then standardized and diluted with salt solution so that the tricresol content is greatly reduced and merely sufficient remains to act as a preservative.

The aim of the above procedures is to maintain the germs in an environment as similar as possible to that which they have become accustomed to in their growth in the human body—namely, temperature, human blood medium, absence of direct sunlight, etc.

Notwithstanding the great care used in making sputum cultures and the subsequent preparation of vaccines, it has occurred to us there is still some question whether the offending organisms are always obtained, and accordingly we have turned to complement fixation tests for help.

When the body is invaded by organisms which set up an inflammatory process, it usually reacts by the formation of specific protective substances, antibodies, etc., which may circulate in the blood. By using appropriate antigens these antibodies can be detected in the test-tube by their ability to fix complement. Stock antigens are kept on hand prepared from various micro-organisms which may cause inflammation, as, colon bacillus, *Mic. catarrhalis*, diphtheroid bacilli, Friedlaender's bacillus, gonococcus, influenza bacillus, pneumococcus, staphylococcus and streptococcus.

These antigens are prepared from numerous strains of each organism as follows: The germs are cultivated on appropriate media,

scraped off into sterile salt solution, shaken for twenty-four hours in a bottle containing glass beads, filtered through paper to remove the beads, 0.5 per cent. phenol added, and then titrated. Autogenous antigens are also made from the bacteria isolated from the patient's sputum by suspending them in 0.85 per cent. salt solution. Slightly less than one-half the anticomplementary dose of these antigens is used in the fixation tests.

The tests are carried out as follows: 0.1 c.cm. patient's serum is added to the proper dose of all these antigens plus 0.5 c.cm. guinea-pig complement diluted 1:10 plus saline q. s. 2.0 c.cm.; incubated in water-bath at 38° C. for thirty minutes; then two units of anti-human amboceptor plus 0.2 c.cm. 5 per cent. human corpuscle suspension are added and again incubated for thirty minutes, after which time the results are read. The customary serum, antigen, hemolysis, complement, and corpuscle controls are always set up.

After reading the results of a given test those antigens which cause fixation of complement in the presence of the patient's serum are composed of germs similar to those producing the inflammation. For example, a pneumococcus is isolated. In the test, the tubes containing both the stock pneumococcus antigen and the antigen made from the isolated germ show that complement has been fixed. With this evidence at hand it is certain that the proper germ has been recovered from the sputum and good results should follow the administration of a vaccine made from it. Also, if another germ amongst the stock antigens fixes complement, which differs from the autogenous one, it is reasonable to add this germ to the vaccine with the expectation that it will be of help. It seldom happens that the autogenous antigen fails to fix complement, thus giving assurance that the proper germ has been grown from the sputum; very much less constantly does the corresponding stock antigen give fixation, especially the streptococcus, indicating most probably that notwithstanding the number of strains composing the stock antigen—fourteen in the streptococcus—it does not contain the particular strain represented by the autogenous antigen.

We have followed the herein described technique for making sputum cultures and vaccines for the past two and one-half years and the controlling complement fixation tests have been made on many of the patients. It seems to us to mark a distinct advance in the diagnosis and prognosis of non-tuberculous pulmonary infections and to place the vaccine therapy of these affections upon a firmer scientific basis than it has previously enjoyed.

In conclusion we wish to say a few words regarding the etiology of the present epidemic of acute respiratory infection. Since the beginning of this epidemic of 'grip,' which started during the first week of December, 1915, we have made sputum cultures from fifty-eight individuals. In over 90 per cent. of them a streptococcus has

been isolated. This germ occurred alone in the acute cases, but was usually accompanied by the *Micrococcus catarrhalis* in the subacute and chronic cases. It has also been grown from three nasal secretions occurring at the onset and from two ear discharges following an attack of 'grip.' The organism is a lanceolate coccus, frequently occurring in pairs or very short chains, is Gram-positive and has the appearance of a pneumococcus. However, it is slightly hemolytic, is not soluble in bile, does not ferment inulin and is pathogenic to mice. Accordingly, it is a streptococcus.

In addition to its almost constant presence in the sputum there are several observations which point to this streptococcus as being the causative germ of the epidemic. In all the cases in which we have tried it, the patient's serum has contained substances which were able to fix complement in the presence of an antigen composed of the streptococci isolated from his sputum. Furthermore, we have injected some of these organisms into the ear vein of rabbits, with the result that there occurred a rise of temperature of about 2° F. during the first twenty-four hours, which receded nearly to normal on the third day. At autopsy most of these rabbits showed a definitely inflamed trachea. The *B. influenzae* has not been found in any of the sputa examined.



THE REPORT OF TWELVE CASES OF PELLAGRA AND ITS  
RELATION TO MENTAL DISEASE.

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The subject of pellagra has aroused considerable public interest during the past few years in this country, so much so that it has become one of national importance, and the attention of the public has been awakened to the situation, as can be observed from the medical as well as the lay press, which indicates the increasing prevalence of the disease in different sections of the country. Prior to 1900 pellagra was unknown in this country, but subsequently it developed so rapidly first in one section of the country and then in another, that now its geographical distribution includes every state in the union, although it is more prevalent in the Southern states and in the warmer climates. The obvious increase in the total number of cases, the high mortality of the disease and its unknown etiology and prophylaxis have created so much alarm among the residents of infected localities that, in addition to the attention given by the separate states, the Federal Government has felt it a duty to appoint commissions for the special study of this disease.

The etiology is still under discussion. In fact, there seems to be no unanimity of opinion as to the real factor responsible for pellagra. The theory which is considered supported by the strongest evidence in this country is that the disease is caused by some nutritional disturbance, for recent researches and observations have favored a deficiency diet theory as the main etiological factor in pellagra. Foreign authorities, however, do not entirely agree with this view, and have rather accepted these theories—namely, (1) that it is due to association with maize products; (2) that it is a protozoal disease transmitted and propagated by a similium; (3) that as Scala and Alessandrina<sup>1</sup> believe, it is due to a mineral colloid; and (4) that it is due to a strepto-bacillus. However, of all these theories, the extraneous deficiency diet appears to be the one which has the most evidence in its favor, from the fact of the great frequency and severity of the disease among people and classes who are poorly nourished. Yet certain obscure and apparently contradictory facts associated with the occurrence and transmission of this disease, which up to the present time have not been

elucidated, would seem to justify the experimenter in regarding the insufficiency diet merely as a predisposing or contributory cause, and research for a further essential and immediate etiological factor, be it parasite or poison, should be continued. For, if the insufficiency diet were the only causative factor, the question arises, Why should this disease occur so frequently in hospitals for mental diseases, only within the past two decades, and why did it not occur there previous to that time? The fact that the population of these institutions is of a peculiar class, who from delusional or other ideas acquire unusual habits in selecting and eating their food, is a factor worthy of note, but this does not fully explain the problem. The same type of population has inhabited institutions of this class for generations; the same faulty adaptation of the individual to reality with the same phantasy formations and symbolic interpretations with their accompanying delusional beliefs have had their influence on the behavior of the patients to all the life-sustaining functions.

The first recognition of the presence of pellagra in this Hospital was in the year 1911, when a young physician from one of the hospitals of the Southern states, while passing through the wards on a visit, discovered a case in a young white woman. The writer's attention having been called to the subject, all similar cases which had previously occurred in the Hospital were brought to mind, and when the records of these cases, all of whom had previously died, were carefully reviewed, evidence was revealed that pellagra had existed here since 1906. During the early summer of 1908, Dr. J. W. Babcock, at that time Superintendent of the Columbia State Hospital in South Carolina, with the writer, visited the colored women's wards of this institution in search of evidence of pellagra. No cases were found among colored women, but the review of the records showed that at least one case in a white patient did exist at the Hospital at that time. Since then the writer has had the pleasure of visiting the Asylum at Kingston, Jamaica (thanks to the courtesy of Dr. D. I. Williams, Superintendent of that Hospital), had the opportunity of seeing numerous cases of pellagra of various types and in various stages. The records of 8 of these 12 cases were reviewed with Dr. Goldberger of the U. S. Public Health Service in the fall of 1913, and he confirmed the diagnosis of pellagra in these 8 cases; the other 4 cases occurred subsequently.

The object of this paper, however, is to discuss the mental symptoms occurring in a certain number of cases of pellagra and the absence of these symptoms in others, rather than its etiological origin, although attention is called to some dietary facts with their possible bearing on the disease.

In the cases here reviewed the most important mental and physical symptoms are abstracted from the clinical records of the Hos-

pital, though the information in some of the earlier cases is comparatively meagre owing to the incompleteness of the data. The main features of the 12 cases are as follow.

CASE I.—White female, *æt.* forty-five, widow, admitted September, 1906. One brother died of pulmonary tuberculosis.

She was treated in a hospital for mental diseases ten years previous and recovered. The medical certificate stated that she had been nervous for some months and was always easily excited. When admitted the physical examination showed heart sounds faint and rapid, pulse-rate 110, breath offensive with the characteristic starvation odor, tongue coated; feet and legs swollen and cyanosed from constant standing. The neurological examination showed deep reflexes, slightly exaggerated. Mentally there was deep depression, facial expression sad, non-communicative, crying and wringing her hands, retarded in speech and movements, expressed ideas of unworthiness, said she should be killed. Owing to the self-depreciatory ideas, would not eat; was tubefed. For the next six months these symptoms continued. She failed physically and lost weight. During the vernal season of 1907 developed stomatitis, which continued throughout the summer months, disappearing in autumn. Mental symptoms continued as above described, although occasionally she was able to do some light work on the ward. Seldom took food voluntarily, was usually spoonfed by the nurse. During the summer of 1908 all the characteristic symptoms of pellagra were manifest. Stomatitis, diarrhea, and symmetrical erythema on hands, wrists and forearms. In August of that year showed symptoms of tuberculosis. Died in September, 1908.

Diagnosis: Manic-depressive psychosis, depressed state, involuntal type, with pellagra.

CASE II.—White female, *æt.* thirty-two on admission in 1886. No family or personal history was recorded, nor were there any notes in this case for the first sixteen years, aside from the fact that this woman had shown mental abnormalities for ten years previous to admission. During the last eight years of her hospital residence she became gradually demented, but the symptoms exhibited periodic variations. At one time she would be quiet and orderly, again very noisy, voluble and had auditory hallucinations. She went regularly to entertainments, cared for herself, always neatly attired, very fond of flowers, always had a bouquet in her possession which she carried about with her. Nurses' notes during those last eight years frequently referred to the fact that she "was peculiar about her food," but gave no explanation of these peculiarities. Physicians' notes in 1906 and 1907 showed memory fair, school knowledge well retained, believed she received telephonic communications, happy in her phantasy world, did light work. No other changes were noted in her condition until 1910, when she showed failing physical health, appetite poor, became apathetic. During the summer months of that year a peculiar erythematous rash appeared over her hands and forearms. She continued to fail, showed physical signs of pulmonary tuberculosis, and died in September, 1910. Diagnosis: Undifferentiated dementia with pellagra.

CASE III.—White female, *æt.* fifty-five on admission in February, 1900. Was noted to have had a psychosis for nine years and had suffered from periodic depressions alternating with excitements for twenty-five years. Was treated for several attacks in private institutions. First notation in the case in 1903 stated that she had passed through cycles of depression, excitement, and lucidity since her admission, seldom remaining in a normal state for more than three weeks. During the next six years her condition did not vary, except it was noted that the depressed and excited periods seemed more prolonged



and the normal state briefer. During the depressions she lost weight, did not eat well, but always gained in weight during excitements. During 1909 she showed the same emotional variations as in previous years, but it was noted she had become stouter. In the early months of 1910 had a severe excitement and in April of that year developed severe gastro-intestinal disturbance with diarrhea and stomatitis; pellagrous erythema appeared. She showed all the physical symptoms of a severe toxemia, with muttering delirium and hallucinations; general muscular tremors. Coarse tremor of hands, twitching of facial muscles, complained of pains in her legs and great suffering, evidently polyneuritis. Knee-kicks exaggerated. Gradually developed contractures of the extremities, had an irregular elevation of temperature, which fluctuated between 99 and 104° F. Died November 24th, 1910. Diagnosis: Manic-depressive psychosis; superimposed on this an intoxication with delirium due to pellagra.

CASE IV.—White female, *æt.* twenty-nine on admission April, 1911. Certificate accompanying patient stated mother suffering from mild type of mental disease, but not in an institution. Patient attended common school until her twentieth year, then earned her living as a clerk for two years and as a traveling saleslady for five years. Then began to show failure of adaptation to her environment, became pregnant and gave birth to an illegitimate child, was unable to keep any regular employment, suffered from deprivations. Went to live at a Church Home and worked for her board. While there thought the young women in the Home were talking about her, said her food was poisoned. When admitted, neurological examination showed deep reflexes, slightly exaggerated. Mental symptoms: Emotional indifference, impulsiveness. Was discharged to the care of her relatives after one month's treatment, but they had her recommitted about two weeks later. Was unable to get along outside the hospital. Upon her return said her brother-in-law tried to poison her. At this time she showed auditory hallucinations, had delusions of persecution, was oriented, emotionally indifferent. Four months after readmission she showed pellagrous stomatitis and eruption over the dorsum of the hands and arms. She lost weight and had poor appetite. Upon special diet, pellagrous symptoms disappeared and have not recurred since 1912. Diagnosis: Dementia præcox with pellagra.

CASE V.—Colored female, *æt.* forty-four on admission June, 1911, from Freedman's Hospital where she had been treated for two weeks for a general breakdown. The certificate stated, "she shows mental symptoms manifested by insomnia, thought people were after her, that her people were going to be killed. Disposition has always been happy, this is the only depression she has ever had. Rambled aimlessly about. When questioned replied with meaningless remarks." When admitted physical examination showed that she was poorly nourished, some exophthalmus, marked genu varum, scaly patches on the chin and arms; lungs, dulness in right apex. Neurological: Gait waddling and slow. Superficial and deep reflexes exaggerated. Mental: Was delirious, showed disorientation, hallucinated and apprehensive. Facial expression fearful, talked irrelevantly. When questioned replied in low, inaudible tones. Two months after admission, gastro-intestinal symptoms were tongue showed large, reddened areas of denuded epithelium, obstinate diarrhea, hemorrhoids and prolapsed rectum. Incontinence of feces. Hands and arms presented cuff-like discoloration, skin dry and scaly. Eyes showed congested conjunctivæ, pupils reacted only slightly to light. Neurological: Great muscular weakness, tremors of hands and arms and muscular tremors of face. Wassermann reaction with blood serum double positive; cerebrospinal fluid, negative. Still delirious. Continued to grow weaker; muscular twitching

of the muscles of the extremities more pronounced, head drawn backward, assumed opisthotonos position. Had convulsions for thirty-six hours prior to her death October 14th, 1911. This case was of the fulminating type. Autopsy: No gross lesions of the brain revealed. Some sclerosis of left carotid artery. Ventricles slightly dilated. Slight granular ependymitis of fourth ventricle. Pericardium contained a slight amount of fluid. Tricuspid valve, leaflets thickened at edges. Right auricle slightly dilated, leaflets thickened. Liver showed fatty degeneration and passive congestion. Thyroid sclerotic. Ovaries sclerosed. Mesentery glands enlarged. Slight peritonitis. Peritoneal surface showed white nodules. Intestines showed chronic enteritis without ulcer formation. Peyer's patches slightly inflamed. Mucous membrane thickened. Suprarenal glands somewhat sclerotic. Microscopical report misplaced. Diagnosis: Intoxication psychosis due to pellagra.

CASE VI.—White female, *æt.* thirty-eight, admitted October, 1911. Family history showed one cousin was insane. Patient had high school education, taught school for nine years and was later a Government clerk. Always enjoyed good health until three months previous to admission, when she noticed an eruption had appeared on the back of her hands and wrists. Became alarmed and thought she had acquired syphilis in some innocent manner. Visited two physicians in the city who also labored under the same idea that she had contracted syphilis and treated her for the same. She continued work but became nervous, had insomnia, and gradually developed visual and auditory hallucinations. While attending religious services thought she saw Christ on the cross, who spoke to her. Gradually became confused, wandered into one of the public parks, where she was apprehended by the police. On entrance to the hospital was found poorly nourished with considerable emaciation. Breath offensive, lips dry and fissured, tongue coated and reddened at the margin. Bowels constipated. A few days later developed diarrhea. Knees and extensor surfaces of the arms reddened and showed considerable scaling of the epidermis. Scaly eruption about the vulva. Neurological examination: Deep reflexes exaggerated, right pupil larger than the left. Mentally was restless and in a deliriod state. Was oriented but had a mistaken identity of persons in her environment. Memory unimpaired. Intelligence tests responded adequately. Was hallucinated and had variable delusions. Expressed herself as having committed an unpardonable sin and was to be punished and put to death. Was apprehensive and depressed. During November and December had severe stomatitis with persistent diarrhea. Several severe convulsions. Refused nourishment, was tubefed. Wassermann reaction with the blood serum was negative. During January and February continued to fail physically and mentally. Delirium persisted. Irregular elevation of temperature with hemorrhages from the bowels. At this time typhoid fever and later bacillary dysentery were suspected, and blood and stools were sent to the U. S. Hygienic Laboratory for examination; results negative. Nervous symptoms became more pronounced; occasionally had severe convulsions. General tremors were present, especially of the hands and arms. Muscles of the face very tremulous. All movements more or less incoordinate. During this period eruption about the hands, arms, and vulva became more noticeable. Irregular elevation of temperature continued, varying from 99 to 102° F. All the above symptoms became more exaggerated. Died March 12th, 1912. Diagnosis: Intoxication psychosis due to pellagra.

CASE VII.—Colored female, *æt.* sixty-seven on admission November, 1913. Nothing of importance in family and personal history aside from the fact that patient suffered from periodic attacks of diarrhea for several years. Certificate accompanying the patient stated that she said they had cut out her



bowels and sewed them up. Said all the lining of her stomach was gone, that she had seen relatives who were dead, that she saw angels and canary birds flying about the ward. When received in this hospital the lungs showed fine râles in the posterior border. Heart sounds clear but sharp. Pulse full, accessible arteries sclerotic. One enlarged gland in the right groin. Tongue coated, very red and inflamed about the edges. Profuse and persistent diarrhea with hemorrhoids. Neurological examination: Unable to differentiate between the head and point of a pin, heat or cold. Touch tests uncertain. (These failures were due in some degree to her clouding of consciousness.) Movements incoordinate. Pupils equal, did not accommodate to light. Deep reflexes exaggerated. Mental examination: Delirious and hallucinated, partially oriented, failure of memory for both recent and remote events. Wassermann test with blood serum and spinal fluid negative. Stools examined for amebic dysentery with negative results. In December and January failed both physically and mentally, and all above symptoms became more pronounced; severe stomatitis. At this time there was an area of thickened and excoriated epidermis over each elbow; skin over the surfaces of the wrists and forearms very much discolored. Scaling of the epidermis over the vertebral prominence. Refused food and was tubefed. For the next six weeks the disease progressed, there was a marked tenderness along the course of the nerve trunks of the legs; many tender points along the spine. Deep reflexes exaggerated and many of the muscles of the arms and legs showed a clonus. Ankle clonus present, more marked on the right side, fine tremors of muscles about the face, coarse tremor of hands and arms and many of the muscles of the body. Patient died March 17th, 1914. Diagnosis: Intoxication psychosis due to pellagra.

CASE VIII.—White female, *æ*t. fifty-seven on admission November, 1912. Nothing known of family and personal history. Medical certificate accompanying patient stated that prior to two years ago was bright and cheerful and able to attend to her own business; became depressed a year ago. Had shown change in her disposition previous to that. Refused to eat or read. Would not undress herself or associate with any of her friends. Went for days without talking to anyone. Irritable, profane, kicked and slapped the nurse, untidy in person and dress, would not go to bed unless forced to do so. Threatened to kill the nurse if she did not stop bothering her. Was treated in private institutions for a year previous to admission here. On entrance was poorly nourished, refused food, and was tubefed. Slight dullness over apex of left lung; heart sounds roughened, accessible arteries sclerotic, marked arcus senilis present. Bowels constipated, deep reflexes exaggerated. Wassermann reaction with blood serum negative. Mentally was inaccessible; all responses to questions were profane and obscene. Negativistic, resisted all attention, was resistive and pugnacious, violent, destructive and abusive. For the next six months her condition remained stationary. At times would take nourishment voluntarily, and then was spoonfed or tubefed. Was very untidy in her habits, used her shoes for a toilet, rubbed fecal matter in her hair and clothes, frequently made unprovoked assaults. During the summer of 1913 all the characteristic symptoms of pellagra appeared. Erythematous eruption over the back of the hands and forearms was very pronounced. Later, insteps excoriated and bleeding. All these symptoms subsided during the fall of 1913. Since then the patient's condition has not varied; during the summer months there has always been a seasonal recurrence of the pellagrous symptoms which remain in abeyance during the cold season. Has always been inaccessible, although on one occasion she became rather friendly toward one of the nurses and told her of the large quantities of food she usually secreted about her person and ate when no one knew anything about it. She said her thirst was so great she drank quantities of water when no one was looking at her, that



she drank from the heel of her shoe and from any receptacle she could use. After she used a tumbler to drink from, she put fecal matter in it to prevent her using it again for the same purpose. Said she didn't want to drink or eat but was compelled to do so because of her great thirst. The pellagrous symptoms are in abeyance at the present time. Patient is still oriented, comprehends everything in her environment, memory is unimpaired; she is still irritable and fretful and pugnacious. Diagnosis: Dementia associated with arteriosclerosis and pellagra.

CASE IX.—White female, *æt.* thirty, admitted January, 1911. Has a bad family history. Two maternal uncles suffered from mental disease; one brother is a patient in this hospital, diagnosis dementia præcox; one maternal cousin died in this hospital, diagnosis dementia præcox. Personal history shows she was always delicate as a child. Entered the Government service when nineteen years of age; remained there for nine years; her salary was gradually increased to \$900 per annum. Menses established at sixteen, never regular; menopause at twenty-four. On entrance physical examination showed facies infantile in type, growths of hair across the arms and shoulders resembling lanugo. Pigmentation of right forearm. Appetite poor, constipated. Neurological. Some analgesia to pinpricks, deep reflexes exaggerated, slight tremor of tongue. Wassermann test with the blood serum negative. Mental: Was oriented, emotional apathy; took no interest in her environment; responded well to all intellectual tests. Self-centered, and while she denied hallucinations they were apparently present. She continued in this state for three years, although gradually becoming deteriorated, which was manifested by ill-defined delusions of religious and sexual nature. Expressed the desire to marry or enter a religious order. The delusional content as well as the emotional indifference showed she was gradually withdrawing from the world of reality and the picture was a præcox mechanism. Occasionally would become excited, and would give expression to the unconscious. She would drape a black shawl over her head and face it with a piece of white cloth to give the appearance of a nun. Would not eat unless carefully watched by her nurses. In the summer of 1914 all the physical signs of pellagra appeared. The eruption appeared over the hands, arms and instep. Mouth became very sore; the whole mucous membrane was very much reddened; had diarrhea. Again had seasonal returns of pellagra during the summer of 1915, which disappeared on special diet. Diagnosis: Dementia præcox with pellagra.

CASE X.—Colored female, *æt.* forty-four on admission May, 1915. There was a history in this case that the patient had suffered at least from one attack of pellagra one year previous to admission. Personal history showed typhoid fever at twenty-two years of age; following this always suffered from headaches. Earned her living as a domestic after her twelfth year. Married at the age of twenty, had two children. Certificate stated that about two months before admission she began to suffer from headache and dizziness; had spells which would last fifteen minutes. Her sister said these were not convulsions, but the patient could not speak and would grab at herself. There was no period of unconsciousness, nor did she sleep following these attacks. She talked relevantly and coherently, was restless and would not eat or sleep. Two days before admission here she was taken to Washington Asylum Hospital where she became noisy and uncontrollable. On entrance physical examination showed a slight excoriation and darkened area of the hands and arms, gauntlet in type. Roughening of the skin over vertebral prominence; skin about the toes was dry and cracked. Neurological: Was unable to cooperate with the examiner. Tremor about the mouth and coarse tremor of the hands. Great myototic irritability. Gait uncertain. Deep reflexes exag-

gerated. Slight ankle clonus present on both sides. Wassermann reaction with the blood serum was double positive. Several unsuccessful attempts were made to secure spinal fluid. Urinalysis showed albumin, granular and hyaline casts. Mental: Markedly confused; attention could not be gained or held; seemed oblivious of everything that was said, muttered constantly to herself. Weakness progressed gradually. On June 7th had several intestinal hemorrhages. Showed tremor of all muscles of the body. Tongue was red and very much inflamed. Died June 13th, 1915. Autopsy: Dura thick and adherent to skull. Internal surface showed intense engorgement. Pia slightly opaque over convexity, and slight granular exudate over same region. Appearance milky along the course of the vessels which stood out prominently. Basal vessels tough and tortuous. Cerebrospinal fluid increased. Heart slightly enlarged. Right auricle dilated. Small vegetative patch present on mitral valve. Liver shrunken. Cut with increased resistance. Intestines showed inflammation present and adhesions in region of appendix. Several ecchymotic spots over whole gut. Two small ulcers round the sigmoid. Spleen showed capsule thick and pulp dark red in color. Kidneys showed parenchymatous nephritis. Microscopical examination disclosed ganglion cells showing chromatolysis, and severe changes present in some areas. Neuroglia tissue: Slight hyperplasia in evidence. Vessels: Wall thickened. Disintegration products: Pigment. Diagnosis: Intoxication psychosis due to pellagra, fulminating type.

CASE XI.—Colored female, *æ*t. forty-one, D. C. prisoner, admitted October, 1909. The records show that the parents as well as the patient used alcohol to excess. Patient was also a morphine and cocaine habitué. From her twelfth year earned her own living. Married at fourteen; had one miscarriage and one stillborn child. Served a number of sentences in prison for minor offenses, such as alcoholism, disorderly conduct, etc. When admitted here was serving a sentence of seven months and fifteen days for petty larceny. Medical certificate stated, "The first symptoms became manifest three weeks ago, with delusions of persecution; said the other prisoners were putting dynamite in her room, and putting rat-bane in her food. The warden and other prison officers swore at her in a vile way and looked through a hole in her cell to see her undress. Heard other voices reviling her; made homicidal assaults on fellow prisoners." On entrance was poorly nourished, deep reflexes slightly diminished. About six months later showed the physical symptoms of pulmonary tuberculosis. Mental examination: was hallucinated, had delusions of persecution. She thought her husband and other men were in the basement talking to her. She was 'oriented in all fields and showed no memory defects. Owing to the constant auditory hallucinations without any marked deterioration, a provisional diagnosis in this case was made of an alcoholic hallucinosis. Six years after admission the Wassermann test with blood serum showed a double positive reaction and the spinal fluid gave evidence that this patient was suffering from cerebral syphilis. The neurological examination at this time aided in the confirmation of this diagnosis. Throughout the course of her illness she was actively hallucinated, especially the auditory type. She would dig holes in the wall or the floor in an effort to reach the electric wires she thought were being applied to her body. She thought poison was placed in her food and that the nurses and other patients expectorated on her plate at meal-time. She always did light work on the ward and treated her nurses courteously and was pleasant and agreeable with them. In the summer of 1915 she gave evidences of pellagra. At this time she appeared more dull and apathetic, but on a well-balanced diet the pellagrous symptoms disappeared. Diagnosis: Cerebral syphilis; alcoholism and pellagra.

CASE XII.—White female, *æ*t. fifty-seven; admitted March, 1915, with a history that her mother was insane for several years. Personal history: Patient had a severe attack of inflammatory rheumatism in her fifth year, which was followed by chorea which continued until her fifteenth year. Had pellagra in 1914. Married at twenty-four years; four children. Manifested the first mental symptoms four years before admission, following the death of her husband and mother; subsequently had an operation for gall-stones and appendicitis. Her mental symptoms became so pronounced that it was necessary to admit her to this hospital. On entrance, well nourished, slight ptosis and a blepharospasm of both eyes manifested by constant blinking. Dulness over apices of both lungs. Breath sounds harsh. Vocal fremitus increased along the spine and below the scapulæ. Heart enlarged. Apex beat in the sixth interspace. Impulse heaving. First mitral and second pulmonic sounds accentuated. First aortic sound was not heard. Pulse irregular and bounding and accessible arteries sclerosed. Lips cyanotic. Mental examination: Was very euphoric, self-satisfied and egotistical in her behavior. Said she had offered herself in marriage to a young clergyman who was twenty years her junior. Said she knew this clergyman was in love with her. She said all his sermons were directed toward her and in all these sermons he indicated he was in love with her. She had become very irritable toward her father with whom she made her home. Delusions were changeable from day to day. One day she called the patients on the ward together and preached a sermon to them for an hour. Said the Lord had instructed her to carry out His word and preach to the sinful and wayward. July, 1915, pellagrous eruption appeared over hands and wrists. At this time the patient and her family gave a history that she had had a similar eruption the previous summer. This patient has been very changeable in her desire for food. She has eaten first one article of diet and then another and then abstained from food for several meals. Will eat a meal once in a while, then refuse food for several days. The pellagrous symptoms disappeared after one month upon a well-mixed diet, but the patient has not improved physically. Is rather anemic, but she is well oriented, memory unimpaired, and the onset of the pellagra did not change the mental picture in this case. Diagnosis: Dementia with arteriosclerosis and pellagra.

*Mental Types.*—The question whether there is a pellagrous psychosis in a true sense, that is, a mental disturbance of peculiar nature wholly due to the disease pellagra, has not been fully determined, but most psychiatrists agree that the mental picture does not constitute a distinct clinical entity. Some authors have described a mental reaction which is designated as pellagrous psychosis—a picture that is variable and which may be confused with paresis or typhoid fever—and refer to it as a typhoid type and a general paralytic type of pellagra, and a pseudo-paretic type, as mentioned by Marie.<sup>2</sup>

Rossi,<sup>3</sup> in discussing the symptomatologic peculiarities in the psychotic symptoms of pellagra, states as follows: "According to my own personal impressions, the mental disorders of pellagra fall into two classes which may, perhaps, represent only variations of the same psychosis; in the one, depression is dominant, in the other confusion. But the former is not to be identified with melancholia, nor the latter with amentia. . . . The picture of confusion



reaches its most complete form in that condition which is known as pellagra typhoid. Here the difficulty of separating other causes of a mental disorder are even greater."

Singer,<sup>4</sup> in the Second Progress Report of the Thompson-McFadden Pellagra Commission, has ably discussed the mental and nervous disorders occurring in pellagra.

The Annual Report of the Georgia State Sanitarium, 1914,<sup>5</sup> contains the following concerning the mental syndrome in pellagra: "Under this heading is included a large number of cases which apparently have in pellagra a common etiological basis, although varying widely in symptomatology. The most frequent picture presented by them is one of delirium and confusion, which we have hitherto designated as an 'infective exhaustive' type. The term is still retained, although it might be advisable to speak of such a state as 'toxic,' for the former term bears with it a suggestion as to the etiology of the disease, the determination of which has not found general acceptance.

"In other cases are encountered manic states, depressed states, etc., to designate which we use the name of the psychosis, the symptoms of which are more nearly simulated at the time. It does not follow, however, that there may not be a transition from one type to another. In some cases the symptoms are so confused that no type can be assigned."

Jelliffe and White,<sup>6</sup> discuss the mental manifestations of pellagra in their new work as follows: "Many new cases present no nervous or mental symptoms at all. In those who do, there seems to be a tendency towards a variable localization of the disease. There seem to be cases in which the spinal cord suffers most and others in which the brain suffers most. In this latter group a condition of very *acute delirium* may be developed, running a rapid course to fatal termination and reminding one of the acute forms of paresis. The more frequent condition, of which we have seen a number of cases, seems to be in the nature of a *simple retardation*. The patient moves slowly, or not at all, and answers questions after a long delay in a low tone of voice and in monosyllables. There does not go with this retardation, however, a corresponding emotional depression as in melancholia. We have also seen *pellagra-phobia* in an infected territory. With this disease as with many others, it must not be forgotten that it may be associated with various psychoses without having any specific relation to them. This is peculiarly so in this country, as the large group of cases which have occurred have been in hospitals for the insane."

Whatever may be the characteristics of the psychic and nervous disturbances in pellagra, in the opinion of the writer, nothing has been brought out which distinguishes them from psychiatric manifestations in an exhaustion delirium developing from other toxic

infections. The entire disease picture, with its psychotic manifestations, confusion, etc., whereby the unconscious receives distinct expression showing the disintegration of consciousness, differs in no radical manner from other mental pictures occurring in other intoxications.

In studying the mental syndrome in the 12 cases of pellagra here referred to, one is impressed by the fact that the psychotic types are as follow: First, an intoxication psychosis with an acute delirium resulting from the pellagrous toxemia, or an intoxication psychosis as the result of a reaction to the toxemia superimposed on the original psychosis, producing a combined psychosis. Second, pellagra may occur in any given psychosis and yet not influence the psychotic manifestations of the original disease in any degree, and in this latter connection it has occurred to the writer that in this respect pellagra is somewhat similar to the syphilitic infection; in only a small percentage of mental cases of patients infected with syphilis is the nervous system involved resulting in parasyphilis. Just so, all pellagrins do not manifest an infection of the nervous system; for example, it appears probable that a case of dementia præcox may have either syphilis or pellagra without additional involvement of the nervous system.

#### DIFFERENTIAL DIAGNOSIS.

When admitted, the mental syndrome in 4 of these cases, Nos. V, VI, VII and X, showed an acute intoxication delirium which simulated acute progressive general paresis, and in some other respects the picture resembled typhoid fever with an involvement of the nervous system. These diagnoses were only negatived when recourse was had to the laboratory findings. The appearance of the characteristic erythema determined the diagnosis of pellagra in all cases.

Case V, a colored woman, forty-three years of age, when admitted was in the advanced stages of pellagra, but the condition was not diagnosed as such for several weeks, or until the eruption appeared. The neurological examination suggested general paresis, but the sero- and cytological examinations were negative for syphilis.

Case VI, a white woman, aged thirty-eight, on admission was suffering from a psychosis due to unrecognized pellagra.

While several cases of pellagra had occurred in this Hospital previous to this date, the maize theory of the origin of the disease was the one which then obtained, and as there was no history of the use by this patient of the above-mentioned food element, the possibility of pellagra was set aside at that time, and it was only later, after the death of the patient, when the case was reviewed with Dr. Goldberger that it was recognized as a true case of pel-

lagra. From the course of the disease, the convulsions and the neurological findings, this case was confounded with general paresis until this diagnosis was probably eliminated by the negative Wassermann test of the blood serum. The following group of symptoms—extreme prostration, irregular elevation of temperature, obstinate diarrhea with intestinal hemorrhages—made the diagnosis of typhoid fever or bacillary dysentery possible, but these were in turn eliminated when specimens of the blood and stools were sent to the U. S. Hygienic Laboratory for examination. Case VII, a colored woman, sixty-seven years of age, was admitted in a state of extreme toxemia. There were many symptoms suggestive of general paresis, but examination of blood and spinal fluid showed negative results. The feces were examined for amebæ with the same results, and she was classified as a pellagrin only after the characteristic manifestations appeared. Case X, a colored woman aged forty-four years, was in a toxic state on admission. This case was of the fulminating type and terminated fatally after thirty-three days. The mental syndrome was that of an acute delirium, but the neurological findings suggested organic brain disease. Urinalysis showed nephritic condition and the Wassermann test of the blood serum was double positive. Several attempts were made to obtain the spinal fluid, but they were unsuccessful owing to the weakness of the patient. There was a history that this woman had suffered from pellagra the year previous in Virginia. This together with the symptom-complex suggested the diagnosis of pellagra more than that of general paresis, and the case is therefore included in this present series. Case III varies from the others, in view of the fact that it terminated in a combined psychosis, for coincident with the appearance of the pellagra an intoxication delirium developed in a manic-depressive psychosis of twenty-five years' standing. A white woman, aged sixty-five, an inmate for ten years, developed pellagra with the reaction of a severe toxemia. The course of the illness was rapid and death occurred six months after the onset of the pellagra.

In the remaining 7 cases, the appearance of pellagra did not seem to influence the existing psychosis to any marked degree. Thus in Case I pellagra occurred in a white woman forty-five years of age, nine months after admission, who had had an attack of mental disturbance ten years previously. Diagnosis: Involutional melancholia or epochal manifestation in manic-depressive psychosis. The development of pellagra in this case did not change the mental syndrome, and there was no evidence of a toxic reaction. The cause of death was pulmonary tuberculosis which developed two months before death. Case II, white woman, aged fifty-six, had been an inmate of the hospital twenty-four years when the pellag-



rous symptoms occurred. Owing to the sparseness of the records, the mental diagnosis 'undifferentiated dementia' was made, but the fact that the psychosis developed in the twenty-second year and the extracts of the history, scanty as they were, both tended to show a præcox mechanism. No specific relationship could be established between the psychosis and the pellagra. Cause of death, pulmonary tuberculosis. Cases IV and IX, white women, twenty-nine and thirty-five years of age respectively, suffering from dementia præcox, developed pellagra, the former three months and the latter three years after admission. The appearance of this complication was again without influence on the original psychosis. In Case VIII, pellagra occurred in a white woman aged sixty-seven, six months after admission. Mental diagnosis: Arteriosclerotic dementia. This psychosis was uninfluenced by the development of pellagra. Case XI, colored woman, aged forty-seven; provisional diagnosis, intoxication psychosis, alcoholic hallucinosis. There was no Wassermann test made until six years after admission, when the blood and cerebrospinal fluid gave evidence of a syphilitic involvement of the nervous system, and the picture to-day is clearly that of cerebral syphilis. The pellagrous erythema, the cuff-like discoloration on the hands and wrists, appeared during June, 1915. After this the patient seemed more apathetic and dull, but the psychotic manifestations were unchanged. Case XII, white woman, aged fifty-seven, suffering from arteriosclerosis with mental deterioration, had pellagra one year prior to admission, but the symptoms were in abeyance when she was received in this hospital. There was a recurrence of the disease six months later. Neither the nervous nor mental symptoms were changed with the appearance of the pellagrous syndrome. The essential psychosis is arteriosclerosis and the pellagra a secondary manifestation.

*Nervous Syndrome.*—The nervous syndrome in the 5 cases in which the toxemia was of a virulent nature was restlessness, irritability, muscular weakness, convulsions, ataxia, tremors with extreme myototic irritability, contractures of the extremities, exaggeration of the tendon reflexes. There were no pronounced neurological symptoms obvious in the several cases wherein the mental symptoms were not directly in relation to the pellagra.

The pathology of the disease is unknown. While much work has been done along these lines, the results have only shown a widespread generalized toxemia of the central and peripheral nervous system. Only 2 of these cases were autopsied, Cases V and X respectively. In neither were the macroscopical findings of special interest. In the former case the microscopical reports were misplaced and in the latter nothing of special note was revealed.

To summarize, the psychotic types are as follow:—

Intoxication psychosis due to pellagra.....	4
Manic-depressive psychosis combined with an intoxication psychosis superimposed thereon, producing a combined psychosis. ....	1
Manic-depressive psychosis with pellagra.....	1
Dementia præcox psychosis with pellagra.....	2
Arteriosclerotic psychosis with pellagra.....	2
Undifferentiated dementia with pellagra.....	1
Cerebral syphilis with pellagra.....	1
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#### DIETARY.

In this connection the extensive and much discussed problem of diet in public institutions is well worthy of continued investigation. The diet of the Government Hospital for the Insane is extremely liberal. Much attention is given to suitable combinations of food, together with a qualitative division of food elements, so that the diet on the wards is well-balanced and the nutritional value is all that can be desired. Some interesting investigations for determining dietary standards were made by the Department of Agriculture in this Hospital in 1903 and 1904.\*

Of the 4 cases admitted in the advanced stage of the intoxication, nothing is known of their dietary habits, but their general appearance, extreme emaciation, etc., on admission left no doubt that there had been a deficiency of nutrition.

There is a history in each of the other 7 cases of peculiarities and irregularities in diet during residence in this Hospital. Case I had been an inmate for nine months, and the records in her case showed peculiarities of diet, refusal to eat, and forced feeding. Case II, a resident for twenty-four years; nurses' notes during the last years of her residence stated that "she was peculiar in her diet," but gave no explanation as to the nature of these peculiarities. Case III, during depressions required forced spoon-feeding, and at times would not eat any meat. Case IV showed pellagra three months after admission; at least one year previous to her advent to the Hospital, had a severe struggle for existence, barely earning enough to live on. There is a history here of deficiency diet but not of a selective one. In this case, under the regular hospital diet, there has been no evidence of the disease for three years. Case IX had a poor appetite and abstained from food from a delusional standpoint. Case XI had similar delusional ideas, and refused food, especially milk and eggs, throughout her stay here.

\*U. S. Department of Agriculture, Bulletin No. 150, Dietary Studies at the Government Hospital for the Insane, Washington, D. C. By H. A. Pratt and R. D. Milner, 1904.

Case XII refused first one article of food and then another, for delusional reasons.

Notwithstanding the fact that some of these patients who developed the disease after a considerable period of residence here were located on the best wards, the majority were on special diet, but it is difficult to find a common factor among the dietaries which can be held responsible for the condition.

In view of all the difficulties presented by this disease, which has become a national hygienic problem, experiments are still being made under all combinations of circumstances. In connection with the diet insufficiency hypothesis, the fact is realized that in order to prove a specific diet deficiency to be directly responsible for a given symptom-complex, it must be demonstrated that the association between the suspected diet and the symptoms is sufficiently frequent. Absolutely irrefutable proof would exist only by the discovery of what the constant deficiency element is, and that by supplying it, the disease is prevented or cured.

The recent tests made by Goldberger, Wheeler, and Willets<sup>7</sup> among volunteer convicts, were steps in this direction. The experimental causation of pellagra in a group of human beings, as well as the cure and prevention of the disease among three groups of persons widely separated geographically, showed the great importance of a nutritional element in the production of the disease, but no particular article of food has as yet been singled out, to the absence or presence of which the disease is due.

All recently acquired facts suggest that notwithstanding the great amount of work that has been done, there is yet a wide field for further investigation. It is of problematic interest to psychiatrists to investigate all hypotheses, and in hospitals for mental diseases much valuable research work can be done towards the elucidation of the dietary question which is absorbing so much attention at the present time. In these institutions the majority of the population has a permanent residence with an invariable environment, and records extending over long periods of years are kept of the variations in their mental and physical conditions. The definite knowledge of the facts necessary to enable adequate measures of prevention and cure to be undertaken, can only be gained by conducting observations in the scientific and accurate manner which is possible under the conditions which exist in the institutions mentioned, where the records and methods may be standardized and the information gained at various times and in different localities can be correlated.

To attain this end it is indispensable that the inquiries into the dietary history of the patients should become more detailed than hitherto, and should be carried out with a direct view to the solution of this etiologic problem.



In conclusion, pellagra may be associated with various psychoses, without having any specific relation to them, or it may be the causative factor in producing a toxic psychosis. The etiology remains obscure notwithstanding the numerous theories advanced by different authorities. The diet theory is of sufficient importance to make nutrition a subject for careful study.

In hospitals for mental diseases where pellagra is of such frequent occurrence, the conditions are well suited for conducting experimental investigations of the pellagra problem.

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## FOOD AND DRUG IDIOSYNCRASY.

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*"Der Mensch ist was er isst."\**

The subject of idiosyncrasy has been shrouded in mystery. Many attempts have been made to analyze and define it, but apparently without success. Its etiology and morbid physiology are still a matter of conjecture and speculation. A little more light on the subject, which this paper hopes to shed, will perhaps not prove superfluous.

Idiosyncrasy has been defined as individual peculiarity affecting one individual in a way it does not affect another. It has been considered of obscure, capricious etiology producing untoward symptoms without apparent cause. Some thought it to be an abnormal reaction of certain foods or drugs—their active constituents—with the principles of the economy of particular individuals, forming, as it were, body incompatibilities and followed by corresponding symptomatic phenomena.

A few have simplified it by stating that just as some substances 'agree' with many individuals, certain ones 'disagree' with others. Many thought that poisonous bodies—chemically- complex, ptomain-, alkaloid-, or leukomain-like in nature—form through mysterious metabolic perversion which causes corresponding untoward manifestations and the like. All these seem indefinite and scientifically unsatisfactory, based more on conjecture than on logic, experimentation, observation and conclusion.

Idiosyncrasy manifests itself in various ways and forms according to the characteristic of the drug taken or food ingested. Nausea, vomiting, gastro-intestinal derangements of all kinds, rapid sthenic or asthenic pulse, cold perspiration, severe headache, dizziness, various skin eruptions, and, in extreme instances, shock and even collapse may acutely appear in those subject to these peculiar conditions. At times the administration of relatively minute doses of certain non-poisonous drugs, or the ingestion of insignificantly small, often just a trace of a particular food-substance is enough to produce alarming and puzzling symptoms, causing the observer and thinker to wonder what the etiological factors, the morbid physiology and the histological pathology are.

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\*The man is what he eats. (Ludwig Feuerbach, *Gottheit, Freiheit und Unsterblichkeit Von Standpunkt der Anthropologie*, p. 5.)

The analysis of idiosyncrasy may be begun with a short discussion of the physiologic chemistry of the body from a particular point of view. Briefly, substances of which the body is composed are proteins, fats, carbohydrates, various acids, mineral matter and water (the last two unimportant as far as this subject is concerned). These wear out, oxidize constantly through physical and mental activity, production of body heat and energy, repair and construction of tissues and the like, and are replaced by the ingestion of foods—substances more or less similar in composition to those destroyed by body functions and capable of digestion, assimilation and anabolic transformation into various systemic elements. Obviously, the food ingested should be of exact volume, nature, variety, proximate and ultimate composition as those of the tissues oxidized in order to compensate each organ, tissue and cell, for the particular principle and element lost. It would seem highly important that the equilibrium between tissue-oxidation and food-ingestion be exact, both in quantity and quality, or a disarrangement in size, shape, consistency and function would result. That such is not the case, the diet at various times varying rather widely in quantity and composition in one individual as well as in individuals of different walks of life, with no body derangement ensuing, may be ascribed to the possession by the body of the property of transforming one food principle into another, or, more precisely, into a substitute that is extremely similar to the original and readily replaces it. Thus the proteins form most of the muscle and bone tissue and are essential to body structure, but they are also, in case of necessity, capable of oxidation-yielding energy and to some extent, transformation into fat, or rather, I believe, an excellent modification or imitation of fat which, as such, serves its purpose satisfactorily. The carbohydrates, for instance, furnish the body with fuel chiefly, but, if taken in excess, are also transformed into fatty tissues. The fat which helps to build up normal tissues is also, if need be, utilized as body fuel, and so on. Thus, through this power of transformation, the proper shape, size, consistency and functions of the various tissues and organs—the body in toto—are maintained. Through this peculiar property one exactly compensates the other to the necessary or desired extent, and the proper proportion of proximate as well as ultimate elements are automatically sustained, though we do not ingest the proportions of various food principles with the supposably essential exactness. Not only this, but under emergencies—such as want, exclusion from the diet or excessive elimination of a particular food principle as a result of disease—the power of transformation is so augmented that one food principle may for a considerable length of time fully supplant another, until the system, thoroughly saturated and fatigued perhaps by the constant effort of transformation, finally



fails. The individual then manifests a craving for the food-principle excluded or excessively eliminated, and symptoms of waste and degeneration appear. If, on the other hand, a certain food is taken in excess of body need for a prolonged period of time, the trophic system, after a primarily increased compensatory elimination of the substance excessively ingested, and subsequent failure of the diverse eliminative factors, will transform such excess into a substance capable of performing body functions in a way similar to the original—serve as fuel, yield energy and the like—until the system is oversaturated with the newly formed substance. The nervous tissues then become irritable, refuse to accept any more of the substance with which they have been overburdened, and the untoward symptoms of idiosyncrasy appear. The economy will always exert immense efforts to utilize, through the power of transformation, any principle with which it has been burdened more or less continuously and regularly and which the enhanced compensatory eliminative factors failed to remove. It will then intimately deposit the transformed product throughout the tissues, and when the maximum point of saturation—endurance—has been overstepped, it becomes irritating to the trophic nervous apparatus. The latter then revolts, and acute morbid manifestations of idiosyncrasy appear. The systemic power of food transformation is wonderfully developed and constitutes one of the mysteries of metabolism of which we know very little. It is this power that will, within rather wide limitations, readily accept one food principle for another and cope satisfactorily with the problem confronted until a morbid oversaturation of the body with the new element ensues. It does this in response to the laws of organic life, in response to the laws of accommodation and existence.

All that is stated in reference to *various* food principles is true of the various forms of *one* food principle, such as the different forms of proteins of either animal or vegetable origin, various kinds of fruits, berries, accessory aliments, condiments and the like. The economy will utilize a certain albumin, vegetable, fruit or berry for a time, transform it into a product capable of answering some body purpose in the multi-perplex realm of systemic economy until the point of trophic oversaturation has been reached; acute morbid symptomatic phenomena will then appear. In other words, an idiosyncrasy to the product with which the body has been supersaturated will have developed. These symptoms will continue to appear during each additional introduction of the substance in question until the system as a result of stoppage of ingestion of this particular substance has had it removed through oxidation and elimination. The idiosyncrasy will then disappear and toleration will be established, which will be in direct proportion to the extent of elimination; this is, if the body economy has rid itself of

a certain amount of the excess, a corresponding ingestion of a 'certain amount' will be tolerated. If all of it has been oxidized and removed, the substance in question will be freely tolerated, and if a food principle be excessively eliminated or oxidized, or more or less completely denied to the economy, a craving for that particular food element will become manifest, showing that another extreme has been reached, that is, a condition opposite to that of the above idiosyncrasy—a hyposaturation—or a deficiency of the particular substance has been created.

There are various factors that tend to modify the facts stated and make the truth obscure and at times difficult to demonstrate. Hypo- or hypersaturation may, for not well understood reasons, be either chemical or physical or intermediary in nature, and the degree, extent, intensity and permanency of the idiosyncrasy caused will correspondingly depend upon whether it is one or the other. The more intimately chemical the oversaturation, the more severe the symptoms will be and the greater the permanency of the idiosyncrasy produced, just as symptoms of CO poisoning will be more prominent and more stable than those of CO<sub>2</sub> for the very same etiological reasons. The age of the individual is also an important factor. Idiosyncrasy caused during embryonic life or infancy will be more permanent and more prominent for the reasons that growth and construction are then very active, material for the same is urgently required, and anxiously, and occasionally indiscriminately utilized. As a result, its systemic incorporation is more intimate and enters into firmer chemical combination; hence elimination is less efficient. Thus through faulty or morbid chemico-biologic intra-uterine metabolism caused either by too rapid developmental processes or perhaps through faulty hygienic eliminative or general morbid conditions of the mother, the body *in utero* may become permanently, excessively, and stably oversaturated with certain principles. Instead of 'definite proportions,' of which tissues are, loosely speaking, made up, we have here 'indefinite proportions' of one or more principles, erroneously formed and chemically united. The system is thus faultily and permanently taxed and forcibly oversaturated with certain elements, proximate or ultimate. Elimination then becomes unnecessary and negative, since a stable, though faulty, composition of body tissues has been firmly established. Ingestion, even of the most minute quantities of the substance or substances in question, will then be an added burden and cause violent and alarming symptoms. We may call this a *natural* idiosyncrasy—one with which the individual is born.

In the establishment of *acquired* idiosyncrasy—that developed during post-uterine life—the period of time during which the substance causing the condition is taken plays a rôle in the production of the extent, degree and manifestation of the idiosyncrasy formed.

Thus if ingested slowly the saturation will be less rapid but more thorough, elimination finally less effective, idiosyncrasy more permanent, and morbid symptomatic phenomena more violent. If, on the other hand, the substance is partaken in large bulk and over a comparatively short period of time, the saturation will be less stable and thorough, elimination more attemptive, and symptomatic manifestations, though violent at times, will, on the whole, disappear more readily. The following experimentation and observation emphasize the truth of the facts presented.

Patients who have taken ether for major surgical operations become nauseated, invariably lose their appetites, get headaches, and become 'sick at the stomach' when they appreciate the smell of ether. This 'getting sick' is more prominent and disappears less rapidly with those who have taken large quantities of ether for prolonged operations than where smaller quantities are taken. Chloroform does the same thing, while a patient who has taken ether will sooner bear the odor of chloroform than that of ether, though this odor is still objectionable to them, it being due, I believe, to some of the properties in common both to ether and chloroform.

I have visited such patients months after they have taken the anesthetic, and found the odor of ether far less objectionable to them than while they were at the hospital, showing that the elimination of the drug with which the body tissues have been saturated has been, at this time, more complete and the saturation less thorough than previously.

I have made a series of observations on immigrants, among whom I count numerous friends, as to the effects of new articles of food they found in their new land. These observations illustrate vividly the facts dwelt upon in this paper. Tomatoes to a great many were perfectly new. They could not eat them in the fresh (ripe) form, and even the smell would procure to them a sensation of nausea and disgust, while they could eat a little piece at a time, in combination with meat or fish, of the pickled (green) tomato, the taste of which resembles that of pickled cucumbers. I suggested that they at first learn to bear the tomato odor continuously, which some found almost impossible to do, then I would induce them to eat, with bread and meat or herring, a thin slice of the ripe sweet vegetable saturated with salt, pepper, or vinegar. This would at first be eaten very reluctantly and only half or one slice at a meal. Its taste would invariably remind many of them of a 'potato fruit,' which grows on a variety of a European potato plant, and which most children have tasted as a result of curiosity. The individual would find it possible in a few days to increase the quantity to half or a whole tomato at a single meal, and in only a short time a wonderful appetite would develop, followed mostly by an overindulgence in the new vegetable. An oversaturation of the



system with the new article would quickly follow, and an idiosyncrasy toward the tomato promptly develop. An attack of gastrointestinal disturbance, in one form or another, combined with one or more of the other symptoms of idiosyncrasy and a disgust for the tomato would again appear. The tomato then again could not be consumed in any quantity—even its smell could not be borne. This would usually continue for months, and in some instances for years, until elimination had freed the system of the excessive tomato-saturation. They would then brave another slice and gradually become accustomed to the vegetable again.

Children born to immigrants in this country during the first few years after their arrival would, when beginning to eat usual food, exhibit similar manifestations towards new articles of diet to which their parents had not become accustomed.

Everything stated in reference to the tomato is true of the banana, with the exception, however, that immigrants having never tasted it before could very much easier become accustomed to its use and indulge in it more readily, until an overdose would usually result in a severe attack of gastro-intestinal disturbance, accompanied by violent manifestations of idiosyncrasy. The smell and even sight of the banana would, for months, produce prominent and peculiar symptoms. In the case of one individual, a girl nineteen years old, healthy and normal apparently in every respect, the picture of a group of fruit including the banana, often seen in dining-rooms, would produce a series of interesting symptoms not limited to the alimentary tract alone.\* It took two and a half years of elimination and oxidation to free the girl's system of the oversaturation; only then could she eat a little piece of a banana without untoward symptoms appearing.

Cantaloupe, asparagus, squash, egg-plant, lettuce, certain berries, wine of elderberries especially, olives, and Swiss cheese produce more or less analogous manifestations in a milder form on those not previously accustomed to their consumption. Watermelon and celery I found to be exceptions. I could not produce an oversaturation with them, I believe, because the former contains a large percentage of water, and immense quantities would be required to produce the same, while the latter is somewhat expensive and somehow would only be eaten a little at a meal. Consequently I could not succeed in producing a systemic oversaturation with these articles in those who never ate them before.

Certain irritants, endogenous or exogenous, will, as a matter of fact, exert certain—first active, then passive and finally latent—action on the nervous system, often taxing it to its fullest physio-

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\*The *modus operandi* of such phenomena, I hope to be able to explain on new bases in a future paper. This subject in itself is interesting and long and cannot be confined within the limits of this conspectus.

logical limit. Any substance taken that acts similarly will in such individuals overstep this physiological limit and cause the nerve cells to rebel; hence, the occasional acute skin eruptions following the administration of calomel, quinine, salicylic acid, copaiba, cubebs, morphine, chloral, coal tar products, etc. Intestinal parasites may also act in a similar way through the production of toxins within the alimentary tract and their subsequent absorption into the system.

The extraordinary symptoms that occasionally follow serotherapy may be ascribed to similar etiological factors. In anaphylaxis, the supersensitiveness is increased by the administration of small doses of proteins. Certain tissues, although naturally and faultily laden with proteins to their full physiological capacity, will still be able to cope with one or more small doses of similar substances injected directly into them. With each added injection, however, the oversaturation is increased, finally reaching a stage where endurance is exceeded, and collapse follows. Since the substances are introduced directly into the circulation, the idiosyncrasy is followed by extremely violent symptoms and death; while of those conveyed through the alimentary tract a good deal is destroyed and eliminated, only portions of the same entering the circulation. Where a single large dose is given at one time, elimination is more attemptive and successful, as is always the case with single large doses of any substance injected or ingested.\*

The craving for sweets in diabetes mellitus is produced by an extreme opposite to that of supersaturation—a deficiency in the carbohydrate elements of the tissues caused by excessive pathologic elimination. We may call this 'negative' idiosyncrasy in contradistinction to 'positive' idiosyncrasy—that caused by an excess of a certain substance with which the tissues are oversaturated. In negative idiosyncrasy the economy, instead of repelling an element that encroaches upon its physiological limits, craves for it because it lacks it. It is all in accordance with the doctrines of life and accommodation. It is a law of 'supply and demand' governed by consumption. For that reason there is a greater need and consequent desire for fat in the cold climates and cold season than when the temperature is warmer. Thus, up to the age of about twenty-five, body generation and integration predominate over degeneration and disintegration. Nature is active, constructing, strengthening. It consequently wants proportionately more food-material for its enhanced activity than during the rest of the

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\*I still hope for an opportunity for blood exchange (transfusion) between two individuals who have developed an idiosyncrasy to one substance. I feel certain that blood of the one introduced into the system of the other will cause the typical symptoms of the necessarily existing conditions.

individual's existence. Until about the age of forty-five an equilibrium between generation and integration and degeneration and disintegration exists, and the quantity of food required is moderate and stable. It about equals the food-value lost in oxidation and expenditure of body energy. From that period on, life has reached a stage where disintegrative and degenerative processes predominate; hence the tendency of the elder to use stimulants in the form of alcoholic beverages, and hence the more pronounced inclination of the man of fifty to take a little whiskey from time to time. The system simply wants a substitute fuel to compensate it for the proportionately excessive destruction of its nutritive principles suffered as a result of the increased degeneration and disintegration throughout this period of life, the alimentary apparatus itself involved in these retrograde changes being incapable to assimilate the extra amount of food required for such compensation.

For similar reasons, that is, since the system repels substances it does not need and attracts those it needs, patients suffering with hypochlorhydria have an affinity for acid substances. I have found this true in a great many instances. If a patient tells me that he frequently eats and enjoys food of acid reaction, I put him on HCl and I usually get good results. An analysis of his gastric contents invariably shows a hypochlorhydria present, while, on the other hand, in the patient having a desire for alkalies, a hyperchlorhydria usually exists. The excessive consumption of water in diabetes insipidus is also explicable on principles of negative idiosyncrasy—the system craving for something it is deficient in through excessive elimination—the existing polyuria.

Even the habit-forming properties of narcotics may be explained on similar bases, with an allowance, however, for the morbid, deadening influence these drugs exert on the nervous system. Their narcotic action makes the nervous tissues less sensitive to the irritation caused by the oversaturation, unless large and rapidly successive quantities are taken; then the phenomena of idiosyncrasy appear. These drugs have an exclusive effect on the nerves, impairing their sensitiveness to pain and discomfort, physical as well as mental, and throw the human unit into a state of euphoria—a dreamy state of non-concern and indifferent happiness. The body requires constantly increasing doses of the drug to obtain that effect, while the drug simultaneously and proportionately deadens the nerve-cells to the constantly increasing irritation caused by the correspondingly increasing supersaturation. We have thus a vicious circle formed which does not permit the symptoms of idiosyncrasy to become manifest.

The cumulative action of digitalis and a great many other drugs



and food principles work along analogous bases,\* the tissues repelling substance with which they are overburdened and attracting those in which they are deficient.

To conclude then, the animal unit, in accordance with the dogma of life and existence, always tends to be the survival of the fittest through the power of accommodation. It will in response to the same accept any food or drug ingested and attempt to transform it into something that will help maintain the process of life. This will continue until first some and finally all the tissues are saturated with the transformed substance to the highest extent of endurance. Any further ingestion of the substance in question will result in the phenomena of idiosyncrasy, which will be more prolonged and intense the younger the individual and the more chemically intimate the saturation. In *acquired* idiosyncrasy, the one caused during post-uterine life, oxidation and elimination may free the system of the oversaturation, either partly or completely, and the untoward symptoms will correspondingly diminish or disappear entirely. In *natural* idiosyncrasy, the one produced during intra-uterine existence, the saturation is more chemical and stable and oxidation and elimination are therefore entirely negative; hence the symptoms enumerated will often manifest themselves throughout life. The symptoms of *positive* idiosyncrasy, those caused by a hypersaturation, will be repelling and revolting in nature, while those of *negative* idiosyncrasy, those created by a hyposaturation, will be attracting in character, expressing itself as a craving for the substance in question. In both instances the intensity of the symptoms will be in direct proportion to the degree of the saturation.

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\*Note that in cases of foods it is the trophic nervous system which supervises nutrition, that is usually and primarily affected by the oversaturation. The other systems are secondarily involved, more or less according to quality, volume, selection, extent of time, and regularity or irregularity with which a principle is consumed. In cases of drugs, on the other hand, selection plays a more important rôle; for example, strychnine exercises a selective action on the spinal cord; nicotine interferes with the function of cardiac inhibition through its action on the vagal preganglionic fibers, but does not affect the heart muscle and the inhibitory postganglionic fibers; while atropine stimulates the heart muscle but paralyzes the postganglionic fibers of the vagus, etc.

REMARKS ON THE TREATMENT OF LOBAR PNEUMONIA  
WITH A DESCRIPTION OF THE AUTHOR'S METHOD.\*

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On different occasions during the last five years the writer has published his views on the treatment of lobar pneumonia,\*\* and these views, brought up to date, are repeated in the present paper.

The percentage of dogmatic treatment in the therapeutics of the present day is still very large, although if we look along the entire line we can see that it is yielding in favor of rational treatment. It seems to yield, however, with particular slowness in spots; and one of those spots is lobar pneumonia. Ten years ago Osler said: "The young practitioner should bear in mind that patients (with lobar pneumonia) are more often damaged than helped by the promiscuous drugging which is still only too prevalent." The condition in that respect does not appear to have changed very much for the better during the succeeding decade, and it would seem now that it is not only the young but the old practitioner as well who should bear in mind Osler's warning.

In attempting to devise a rational method of treating this disease it is proper first to survey the field and see how the land lies, so as to find out as well as our present knowledge permits what are the limitations and possibilities in the case.

In doing this we immediately come to the question of a specific treatment for lobar pneumonia. The ideal specific is, of course, a biological one. Can we cure the disease with vaccines or serums?

On this subject, which is of the highest interest and importance, the evidence, unfortunately, is incomplete and not even satisfactory as far as it goes. The fact that the disease may be caused by different organisms or different strains of the same organism, practically forbids the use of any but autogenous vaccines; and the

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\*Read before the South Side Clinical Society, February 16th, 1916.

\*\*E. E. Cornwall, *The Heart in Lobar Pneumonia, and Its Treatment* (*New York Med. Jour.*, June 14th, 1911); *Practical Suggestions in the Treatment of Lobar Pneumonia* (*Long Island Med. Jour.*, February, 1912); *The Indications for Treatment in Lobar Pneumonia and How to Meet Them* (*Med. Times*, January, 1913); *Observations and Suggestions Regarding Lobar Pneumonia* (*Med. Record*, August 2nd, 1913); *Report of 54 Cases of Lobar Pneumonia Treated by a Special Method* (*New York Med. Jour.*, May 30th, 1914); *A Rational Method of Treating Lobar Pneumonia, With a Report of 133 Cases In Which It Was Used* (*Med. Record*, August 28th, 1915).

fact that the disease is of short duration makes especially difficult the practical application of this method of treatment; and there are also other obstacles which oppose its general use even if it were effective. The situation in regard to serums is likewise unsatisfactory. As the case now stands, we are not justified in doing more than to hope that further investigations along these lines will eventually result in the discovery of an effective and universally applicable biological specific. Certainly we do not possess such a one now.

But how about a drug specific?

In discussing this subject we find ourselves in an atmosphere surcharged with dogmatism. During the twenty-five years of the writer's experience in medicine, he has seen a number of drug specifics recommended for pneumonia; and he has seen most of them, after being extravagantly lauded and zealously advocated and extensively used, abandoned with lingering reluctance; and some of them remain in vogue, despite Osler's warning. It would seem as if specific drug treatment still retained the peculiar attraction which it has always had for the medical profession.

Yet there is no good ground for believing that it is possible to find a chemical poison which will kill pathogenic bacteria without killing the human host. In all the history of medicine, in spite of diligent and extensive search, there appears no instance in which a drug specific for a bacterial disease has been discovered; although for at least two diseases of plasmodial origin, malaria and syphilis, we seem to have such drug specifics. In view of this universal failure to find a drug specific for any disease of strictly bacterial origin, the inference suggests itself that the lowest forms of life, as exemplified in the pathogenic bacteria, are more resistant to chemical poisons than the blood cells and other human tissues. At any rate, we have no specific drug bactericide of proved value, and encouragement to go on with experimentation along that line in lobar pneumonia is lacking, especially in view of the fact that such experimentation cannot be proved to be entirely free from possible harm to the patient.

If we have then no reliable specific treatment for lobar pneumonia, biological or chemical, what is the basis for rational treatment which remains?

The outstanding fact which dominates the situation in the treatment of pneumonia is this, that mankind through generations of experience has developed a natural method of cure for this disease which, working by itself, is successful in a large majority of cases. It is evident, therefore, that the first requisite in a rational method of treatment is that it be entirely subordinate to Nature's method, and that it in no way hinder Nature under the pretence of helping her. This does not mean to wait and do nothing, although to do nothing is better than to do



harmful things. It means to put the patient in the conditions most favorable for the operation of Nature's curative method and to keep him there; and it involves definite and carefully adjusted procedures.

The method of treatment which the writer will now briefly describe consists of such definite and carefully adjusted procedures. He calls it a rational method, because it endeavors to include only procedures for which there appear good reasons, and to exclude all procedures, however celebrated or popular, for which good reasons are lacking. He does not call it *the* rational method, but *a* rational method: the exclusive article 'the' is not claimed for it, because there are doubtless other rational methods, and, it is to be hoped, better ones to come. This method aims to make use of everything which clinical experience and laboratory investigation have proved of value. It is a comprehensive plan of action, a strategical plan, with provisions for emergencies. But while no particular agent is used which is new or startling, and which could give it a nickname, this method in its totality and in some of its features presents an aspect which is sufficiently individual to warrant the manner in which it is here presented.

Following are some of the distinctive features of this method. An important and essential feature is *the administration of a particular, specified diet*. This diet, during the active period of the disease, is limited in quantities of protein and fuel to somewhat less than the minimum health rations; it is fluid, it is easy of digestion, it supplies salts and vitamins needed by the body, and it is of a character to modify favorably the conditions of bacterial activity in the alimentary tract. As ordinarily given, it supplies daily two pints of milk with one pint of cereal gruel or other approved diluent; the strained juice of three oranges made into orangeade with the addition of three ounces of milk sugar and about a pint and a half of water; half a dram of sodium chloride, three-fourths of a dram of calcium chloride or lactate, and water sufficient to bring the total daily fluid intake to about one hundred ounces. The inclusion of fresh fruit juices supplies needed salts and also vitamins. The inclusion of calcium chloride or lactate is in response to a need for that salt which we have reason to believe exists in pneumonia. Calcium, which in certain amount is required by all the tissues of the body to maintain their healthy condition, and particularly by the muscle of the heart to enable it to contract in its best manner, and by the leucocytes to increase their functional activity, is regularly deficient in pneumonia. This condition of calcium starvation is probably chiefly brought about by the withdrawal of the stores of that element in the body to supply extraordinary requirements—namely, to coagulate the fibrin in the consolidated lung, to give war

rations to the leucocytes which are usually increased in number, and even to feed the invading pneumococci, which seize calcium in the enemy's country for their own use.

The regulation of the diet for the purpose of safeguarding the body from injurious bacterial activity in the alimentary tract is directed chiefly against the saprophytic or putrefactive bacteria and the pneumococci which have been swallowed. In previous papers the writer has discussed this phase of the subject, and has advanced the proposition that the toxemia which comes from the alimentary canal is a very large and important, if not the principal element in the toxemia of pneumonia. It has been demonstrated that the pneumococcus is able to live and multiply in the alimentary tract if suitable pabulum is provided, and as the pneumotoxin is an endotoxin and not an exotoxin, it can be soaked out from the pneumococci which have died in the alimentary tract and absorbed therefrom. If the pneumococi in the mouth and throat are washed down with animal broths, which are the best possible culture media for them as well as for the putrefactive bacteria, or with patent foods containing meat extractives, or with egg albumin, it is easy to see how their numbers may be vastly increased in the alimentary tract with a consequent aggravation of the specific toxemia as well as of the habitual putrefactive toxemia.

Another essential feature of this method of treatment is *extreme conservatism in the use of cathartics*. The writer is aware that in condemning the routine and frequent use of cathartics in pneumonia he is going against one of the most cherished traditions of the medical profession, but clinical experience has convinced him that patients do better in this disease if their bowels are not much or often disturbed by artificial evacuations. This, of course, holds true only if they are fed according to the plan above described. If their diet includes animal broths or egg albumin or other good culture media for the saprophytic bacteria and the swallowed pneumococci, or if whole milk is given, which is often a producer of indigestion and gastro-intestinal disorders, then cathartics may be needed to relieve the body of injurious bowel contents. If the patient is given the limited, non-putrefactive diet here recommended, which is almost entirely absorbed and which does not favor injurious bacterial activity in the intestines, the bowel contents are comparatively harmless; and the writer has seen many patients with severe types of the disease go on to recovery with only one or two movements of the bowels, or even none at all. His records include cases which went five, six, seven, eight, and even nine days without a bowel movement. One patient, who went eight days without a movement, was so delirious that he had to be strapped in bed. He defervesced on the eleventh day with a very slow, feeble pulse, but eventually made a good recovery. Another

patient who entered the hospital on the third day of the disease with both lower lobes involved, who was wildly delirious and had to be restrained, received no cathartic at all until the day after defervescence, which was the ninth day after admission, when he was given an enema. He made a good recovery. Both these cases, and many others which the writer has observed, he believes would have had their chances of recovery seriously impaired if they had been purged according to general custom. And it is not only on account of the disturbance of the intestinal mucosa and the production of conditions facilitating toxic absorption that cathartics are to a large extent avoided in this method of treatment; there is another reason for the avoidance of unnecessary catharsis. This reason is found in the fact that evacuations of the bowels, particularly those which are artificially induced, are capable of exciting nervous reflexes, which can seriously disturb the heart when that organ is in an unstable condition, which is often the case with pneumonia. An observation which seems pertinent in this connection is that artificially induced bowel movements, particularly those produced by salines, predispose to tympanites and abdominal distention; which are particularly dangerous in pneumonia on account of mechanical pressure which disturbs the heart.

In this method of treatment the following rules regarding the bowels are observed. If there has been a satisfactory movement within twenty-four hours preceding the time when the patient first comes under observation, no attempt to move the bowels is made unless some special indication appears. But if more than twenty-four hours have elapsed since the last movement, and the patient is in an early stage of the disease, and the heart is in good condition, a simple or soapsuds enema is given, or a dose of castor-oil or other mild vegetable cathartic (never a saline). If the disease is in a later stage, that is, on or after the fourth day, or if there are signs of heart strain, no evacuation is induced, no matter how long is the time since the last movement, except in some, not all, cases with tympanites, which may call for an enema. On the second day after defervescence, if the bowels do not move spontaneously, an enema is usually given, and thereafter laxatives are given as needed.

Of the distinctive features of this method of treatment, probably this one, of not disturbing the bowels, is the one most likely to excite question in the minds of those first hearing of it; but the writer's conviction that it is a feature of positive and great value has constantly increased in strength with clinical experience. Since including this feature in his method of treatment he has noted a marked improvement in the composite clinical picture and in the death-rate.

Another important feature of this method of treatment is *the stimulation of the heart when necessary according to a plan which*



is definite, and flexible in prescribed ways to meet special indications. The heart usually requires some support before the course of the disease is finished, except in the case of infants and young children, who almost never need heart stimulants in this disease. In fact, the very young almost invariably get well if they receive the proper food, nursing and hygiene, provided no drug whatever is given them. In the plan of heart stimulation, which is part of this method of treatment, the administration of heart stimulants in otherwise healthy young and middle-aged adults is usually delayed until signs of heart strain appear, which is usually not later than the fourth day. The first stimulant given is strychnine sulphate in doses of  $\frac{1}{60}$  gr. three times a day or every four hours. If the pulse becomes unduly rapid or the right ventricle shows signs of dilatation, tincture of strophanthus is also given, in doses of  $1\frac{1}{2}$  m. every four hours. If the signs of heart strain become pronounced, the dose of strophanthus is increased to  $2\frac{1}{2}$  or, in extreme cases, to 3 m. (never more), and the dose of strychnine to  $\frac{1}{30}$  gr., and caffeine citrate in 2 gr. doses every four hours is added. More than this amount of heart stimulation is rarely required in cases treated according to this method. If more is needed, the prognosis is apt to be bad. More stimulation can be given as follows: strophanthin,  $\frac{1}{1000}$  to  $\frac{1}{500}$  gr. may be substituted for the tincture of strophanthus, and perhaps digitalin,  $\frac{1}{100}$  gr. every four hours may be added, both being given hypodermically; and also aromatic spirits of ammonia in  $\frac{1}{2}$  dram or dram doses may be given by mouth every hour. Very infrequently a gastric or intestinal idiosyncrasy to strophanthus is found, in which case that drug is omitted and caffeine substituted. In the aged and in those with preexisting heart disease, stimulation is given from the beginning; and in the aged and in those addicted to alcohol, whiskey or brandy also is usually given in small or moderate doses throughout the disease. For extreme dilatation of the right ventricle venesection is believed by the writer to be good treatment, though he has used it in only one case.

Another feature of this method is *definite though conservative treatment of symptoms*. Not all symptoms which appear call for treatment; in fact, symptoms may not be in themselves bad and deserving of ablation. It is possible that some of them may be not so much manifestations of disease as evidences of Nature's counter operations to cure the disease. Fever, for example, may be a constructive procedure on the part of Nature, and be present for a purpose (like high blood-pressure in chronic nephritis); possibly it has something to do with the fight against the invading micro-organisms; perhaps it is an attempt on Nature's part to render the climate of the body unfavorable for them. It is a significant fact that fever regularly accompanies all the severer acute infectious

diseases, and also follows the introduction of their isolated toxins into the blood; while it is rarely present in poisoning not of bacterial origin. The fever which appears as a reaction after the injection of a vaccine may be Nature's response to what she mistakes for a call for defense against bacterial invasion; she may infer from the presence of the toxin of the vaccine that the specific bacteria themselves are present. Certainly fever in pneumonia is a favorable rather than a bad sign, and does not call for treatment except possibly in a very small number of exceptional cases with hyperpyrexia. There are, however, some symptoms which the interests of the patient demand should be alleviated by medical art.

Pain, cough, restlessness and insomnia can harass the patient and deprive him of necessary sleep. They are relieved by the application of hot poultices to the chest and, in the early stages of the disease, perhaps by small doses of morphine or codeine. Opiates, however, should never be given in any but small doses, and never in the later stages of the disease, and never when the respiration is embarrassed. Restlessness at the time of the crisis is often an indication for more heart stimulation.

Diarrhea is treated by restriction of the diet to barley water, rice water, or water alone. Vomiting is treated by stopping all food for a while and perhaps, if it occurs in an early stage of the disease, by small doses of morphine hypodermically.

Tympanites, which is of rare occurrence in patients treated by this method, calls for restriction of the diet to barley water and orange juice, to barley water alone, or to water alone; and, if it is severe, it may call for a simple, or soapsuds, or *fel bovis* enema, and perhaps the introduction of the rectal tube.

Delirium calls for extreme watchfulness and even physical restraint.

Another feature of this method relates to the *supplying of fresh air and the conservative regulation of its temperature*. It has long been an established principle of treatment in pneumonia to supply fresh air to the patient. We are all familiar with the story of the doctor who, on finding all the windows in the sick room closed, punched out a few panes of glass with his cane to impress on those present the necessity for fresh air. In recent years this principle has been emphasized and extended, so that we now have what is called the cold-air treatment of pneumonia, which is a good thing if properly used. But this cold-air treatment is not of universal application; it is not applicable to patients with little or no fever, and especially to elderly patients; and it is distinctly contraindicated after defervescence. The rule in the method of treatment, here described, is to supply plenty of fresh air, and moderately cold air while the patient has much fever, but to make sure that he is kept warm and is protected from drafts after his fever has abated.

Neglect of this precaution, it is reasonable to believe, can be in part responsible for recrudescences, relapses and complications.

Another feature of this method, and by no means the least important one, although a negative feature, consists in *not doing certain things which are very generally done* and which have the sanction of good authority and perhaps of long-continued use. To stop doing something which one has been accustomed to do, or to refuse to do something which nearly everyone else does and approves, is almost as much of a positive act as to do something new. Among these avoided procedures are the following:—

Calomel and magnesium sulphate are never given in this disease, nor any cathartic as a matter of routine. Letting the bowels alone after having safeguarded the patient from the dangers that might come to him from retention of the bowel contents, has already been mentioned as a special feature of this method of treatment, but the routine use of calomel and magnesium sulphate and of excessive purgation is so widespread in the treatment of this disease, that the writer refers to the subject again to emphasize its importance. It is possible that a patient with a pronounced uric acid diathesis may derive benefit from a small dose of calomel given at the beginning of the disease, but there are no exceptions in favor of the Epsom salt. Magnesium sulphate, in addition to possessing the other disadvantages of a saline cathartic in this disease, is a pronounced cardiac depressant and kidney irritant. It is the writer's clinical opinion that the preliminary purge with calomel and magnesium sulphate, which is so commonly used as a routine procedure in this disease, materially aggravates the gravity of the prognosis in the particular case.

Antipyretic drugs are not used. As has been stated, the fever in pneumonia may be a constructive process on the part of Nature, to disturb which would be to hamper Nature. In exceptional cases with long continued hyperpyrexia, antipyretic hydrotherapy might be indicated.

No drug diuretics are given, although water is given in good quantity.

Expectorant drugs are not given. The futility, or worse, of giving expectorants in lobar pneumonia would seem to be obvious.

Digitalis is never given by mouth, and is given hypodermically only as an accessory or reserve stimulant, being esteemed less generally suitable in this disease than some other heart stimulants.

Drugs for an alleged intestinal antiseptic effect are never given. The control of the intestinal flora is managed more effectively and safely, it is believed, by regulation of the diet.

The various drugs which have been recommended for an alleged specific or quasi-specific effect, such as creosote, salicylic acid, quinine, urotropin and camphor, are never used or even considered.



The plan of treating lobar pneumonia outlined in the preceding remarks has been employed by the writer in its entirety from the beginning of the year 1913 to the present time (February 1st, 1916). He has had special opportunities to observe its workings in his services in two hospitals, the Norwegian and Williamsburgh, Brooklyn, where all the cases diagnosed as primary lobar pneumonia, including a few in which the pneumonia may have occurred during the course of an attack of the 'grip,' which were treated by him during the specified period, were treated according to this method. This series is a continuous one, and includes the cases which came into the hospital late in the disease, after previous neglect or bad treatment, and those which were moribund on admission; such as are usually found in general hospitals with large ambulance services that care for poor parts of the city.

This series numbers 160, of whom 19 died in or near the active period of the disease, giving a mortality of 12 per cent.; and 6 more died at a remoter period of complications and sequelæ (one from general sepsis following an operation for empyema, one from cerebral congestion which developed one week after apparent defervescence, one from purulent pericarditis and perirectal abscess, one from abscess of the lung, one from chronic pericardial adhesions, and one from septic endocarditis), giving a gross mortality, if the latter are included, of 16 per cent., which compares very favorably with the mortality in other hospitals having similar services. In a continuous series of 124 cases in the writer's own service in the Norwegian Hospital, which occurred during the six years before he began to use the full plan of treatment here described, the mortality was 31 per cent.

No attempt to draw conclusions from these statistics is made because statistics of this character cannot have conclusive value unless they embrace a very large number of cases, so as to minimize the allowances which must be made for variations in the virulency of the disease, for variations in the proportion of cases admitted to the hospital in bad condition, and for possible errors in clinical diagnosis. They do, however, possess illustrative value; and some of the observations which were made on them possess suggestive value. Following are some of these suggestive observations.

Toxic symptoms appeared to be less frequent than in previous experiences with the disease.

Tympanites was almost unknown except in patients who entered the hospital with it.

Constipation was well borne. Patients went without bowel movements five, six, seven, eight and even nine days and showed no unfavorable symptoms on that account. In many cases the bowels moved spontaneously.

The proportion of deaths among patients showing temperatures of 105° F. and higher, was only slightly larger than the average mortality of the series, although such high temperatures usually mean a severe infection or an extensive lesion.

The systolic blood-pressure expressed in millimeters of mercury fell below the pulse-rate in about three-fourths of the cases which recovered and in which blood-pressure examinations were made. This would seem to invalidate, at least for patients treated according to this method, the statement of Gibson, which has been widely repeated, that the prognosis in pneumonia is bad if the blood-pressure falls below the pulse-rate.

In about one-third of the cases the pulse-rate reached 140 or more, and in many of them the rapid pulse-rate continued for a considerable period; and the clinical impression was received that the myocardium showed a greater endurance than in cases treated by other methods.

In conclusion, the writer will briefly summarize the main points in the treatment of lobar pneumonia according to this method:—

Keep the patient in bed and in the horizontal position until at least ten days after defervescence.

Supply plenty of fresh air, and moderately cold air if there is much fever; but in the aged, in those with little fever, and after defervescence, keep the patient warm and carefully protect him from drafts.

Give a fluid, non-putrefactive diet, composed of modified milk, cereal gruels, fruit juices, milk sugar, sodium chloride, calcium chloride or lactate, and water; which has a daily protein content of not more than 40 grm. and fuel value of not more than 1,300 calories.

Do not move the bowels artificially more than once or twice during the disease, as a rule; and do not move them at all if the case is first seen in the later stages of the disease or if there are signs of heart strain; and use only mild vegetable laxatives or enemas.

Treat symptoms conservatively, remembering that they may be not so much expressions of disease as evidences of reparative activity.

Treat intestinal complications as much as possible by modification of diet.

Use opiates only in the early stages of the disease, and in small doses, and never unless the indication for giving such relief is very plain, and never if there are signs of respiratory distress.

Stimulate the heart as soon as it begins to show signs of strain, and according to a definite plan, using the heart stimulants of choice, which are, strychnine, strophanthus and caffeine. In the aged and those with preexisting heart disease use heart stimulants from the beginning. Practically never use them in infants and young children.

Especially avoid the following things: Unnecessary catharsis and purgation with calomel and Epsom salt; the use of antipyretics, irritant diuretics, expectorants, and sedatives except under the restrictions mentioned; and all attempts at specific drug treatment.

## CHRONIC DISEASE AS A POINT OF DEPARTURE.

REMARKS ON THE NATURE, PHENOMENA AND EXPEDIENTS FOR  
MODIFYING LONG-CONTINUING OR IRREPARABLE DISORDERS.

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Bodily afflictions of any kind or degree put the sufferer to the test as a moral being; verily they 'try men's souls.' When the form is one of continued or irreparable impairment, a greater demand is made on latent psychic as well as physical qualities. One is then called upon to meet altered conditions with serenity and a changed point of view. If it be an injury permanently disabling, such as loss of sight, of hearing, of a part, of a limb, a twisted back, then an entirely new scheme of life must be adopted. What is gone must be left out of consideration; what remains must be conserved and made to discharge amplified duties. Here is the occasion to negotiate an economic adjustment, a philosophical and judicious retreat with honors even. The sooner we all learn the lesson of renunciation, the better.

## I.

The most interesting bodily affliction taxing resourcefulness occurring to many soon or late, is *chronic disease*. This may be due to mere impairment of structure or parts, of organs reducing original efficiency; hence exceptional care is demanded to amplify what remains or to induce other correlated structures to do duty for both.

This fate is by no means so hopeless or even so serious as might at first appear. Common experience demonstrates the admirable adaptability, the wonderful latent instrumentalities of this body of ours. We can get along with far less than our original endowment and with astonishingly little alteration either in happiness or usefulness.\*

When structural alterations, limitations, losses of sensory acuteness, arise in the very young, they are at least spared the primary shock. So promptly and insidiously are the necessary economic

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\*The achievement of notable persons, those who stand high on the rolls of fame, has been charmingly depicted by Mrs. N. P. Shaler in "Masters of Fate" (Duffield Company, New York, 1906). Few of us but have a familiar example of the marvels of adaptation or of heroism and usefulness among our own families and neighbors.



adaptations expected to meet modifications of structure or function, that suffering of body or distress of mind is really less than we, who are called upon to sympathize, are inclined to imagine. While these handicaps should be tenderly reckoned with, the problem becomes chiefly one of pragmatism, a dealing with things as they are, a 'taking account of stock' and making the best of a bad business.

Then it should be realized that many of the most robust of us readily fall into deplorable habits of recklessness, of prodigality of powers leading us astray, marring our personality. Also those who are overstocked with vigor may suddenly fall into evil ways, suffer far more than those who have learned the lesson of renunciation, of compulsory readjustment early in life. We do well to look to these chronic invalids, these maimed creatures, for light, for encouragement, for example. Moreover not a few feeble bodies are endowed with titanic energies, moral force, initiative, apperception, quite as powerful as any which reside in gross carcasses of herculean mould.

We need feel no pity for the possessor of a warped or damaged framework provided the individual is endowed with an energetic, hopeful, wise personality. The human dynamo, the world mover, the bright particular star in the community may readily be a cripple or an incurable derelict.

In the notable little book by Mrs. Shaler referred to, will be found the evidence from several hundred half-disabled souls who yet contributed to the welfare of mankind equally with notable gladiators and world destroyers. Most fortunately the human organism acts and reacts uniformly as a whole. Body and mind force and reinforce each other through good and evil conditions, times and reports.

## II.

The human organism is a vitalized mechanism of infinite complexity and limitless resourcefulness. No part acts alone; each is merely the correlate, the adjunct, the co-worker of every other part.

All remedies for disease are valuable in proportion as they bring to the front, or render available inherent self-protective and self-reparative powers. The body, moreover, is a concrete, living entity, not made up of separate parts, like an insentient machine, any one of which is capable of acting and reacting independently of the rest. In the sentient human machine, wherever there is local damage or derangement, this can be modified only by *eliciting the full co-operation of all the component mechanisms*, and making use of the interdependence of every part. Nowhere is the significance of this cooperation of all parts more direct and important than in the treatment of protracted disabilities and for many reasons. Among these is that, whereas in traumata (injuries, fractures, wounds and

other strictly localized damagements) the remainder of the organism is presumably at the time in a state of full integrity, hence with full capacity for prompt and complete repairs, conditions are quite otherwise in protracted, long-prevailing disorders. The results are manifest in slow but steady disintegration (breaking down) of tissues—in the retroaction caused by depression in both spheres of activity, the mental and physical. Unless the individual is regarded as an all-round intercorrelated and well-balanced organism and full consideration given to all the essential factors constituting health (not forgetting permissible variants), the best results cannot be attained in conservation or in repair.

In acute disease there is fever, a defensive process whereby the self-protective forces are aroused to the performance of their most perfect work. Much can be done to control and direct them. The problem is then relatively simple, since the organism is presumably normal when infected.

### III.

In chronic disabilities the defensive powers are gradually overwhelmed, and the vital forces exhausted in varying directions and degrees. No longer can they be relied on to meet and overcome hurtful agencies promptly and efficiently. Not only so but the causal factors become increasingly complex—a blend of mental confusion, loss of physiologic balance, and structural breakdown. Be the factors few or multiple, the whole symptom-group becomes one of impairment not only of the governing vital mechanisms, but of the entire organism. Remedial agencies must then include systematic encouragement of all functions, rehabilitation not only of disordered noble organs, but of systems deranged as a whole. Hence the best remedies consist of rational, even simple agencies, capable of aiding conservation in the actions of circulation, respiration, food intake and outgo, etc., not forgetting the inevitably impaired consciousness. Mental deviations invariably occur and must be not only first considered but in all stages reckoned with.

The circulation stands first in importance, and the fact that the skin area is the largest, most readily influenced factor in sensation and reflex irritation should never be lost sight of. In chronic disease the compensatory action of the surface circulation can be relied on to affect and to supplement failure in the deeper vascular channels. Much of the all-round vigor of the Greeks was due to their care of the skin.

Respiration stands as the basis of oxygenation, the muscular system being an efficient ally. Both require education and exercise. The digestive organs, elaborate as they are, cannot carry out their complicated program unless they be and remain in full accord with the entire group of hydrostatic (fluid-carrying) mechan-

isms. They cannot act and react harmoniously unless in normal or nearly normal mechanical interrelationships one with another, their centers, nerves and connecting parts unimpaired by faulty position, torsion, compression, or by disarranged or inadequate support from relaxed or feeble external walls.

Indeed much, very much, of visceral incompetence is due to stagnation, compression (hypostasis) in the pelvic organs exerted by the unrelieved weight of the upper upon the lower contents of the abdominal cavity. Gravity begins this damage and it is aggravated by incompetent muscular support. The splanchnic vessels (abdominal blood and lymph channels) must be supplied with adequate counter pressure to sustain circulatory poise.

Surgery has contributed much to the elucidation of conditions existing in the domain of chronic disorders of the hollow organs (visceral), by supplying exact knowledge through sight and touch when the concealing tissues are opened or removed. The integrity of the frame work (bony and ligamentous skeletal structures) here exercises a powerful contributory influence. Not only must these gross structures be maintained at their best, but wherever they suffer impairment beyond permissible degrees, the integrity of the vital processes suffers to an extent too generally overlooked. Elasticity is an essential factor in all tissues except a few rigid ones like the bones, ligaments and tendons. Hence loss of tissue-tone, rigidities, adhesions, excessive compressions and relaxations are factors which demand full consideration in solving any problem of long-standing functional disrepair. Bear in mind that these chronic impairments occur in young children as well as in adults.

#### IV.

Chronic morbid processes, while of wide diversity and due often to special disease effects, none the less are at bottom mere out-growths of vitiated normal processes. Growth forces are uniform in their manifestations, not only when normal, but also when deranged. The human organism is disturbed by disease, of whatsoever nature, along strictly analogous lines. The special features may and do vary, but chiefly in accordance with the structures altered, rather than by reason of the nature or character of the disease itself. The essential machinery, the vital processes of life, growth, change and repair, can, if rightly conserved, be made to do their work satisfactorily as well as the limitation present will permit, oftentimes amazingly. Hence the organism as a whole is usually capable of recovering a fair measure of efficiency.

Physicians too often overlook the fact that these deranged growth processes can frequently be so utilized, brought into line and enhanced as to secure degrees and kinds of betterment not otherwise obtainable.



Often closely analogous phenomena arise in persons suffering from morbid states of widely divergent nature. Remedial resources in chronic disease depend for efficiency upon a correct appreciation of (1) the particular disease process, (2) what remains of the reparative powers of the individual as a whole, and (3) the degree and quality of the integrity of the structures deranged, damaged or destroyed.

Always behind the poison-bearing agencies there is a damaged living organism, *i. e.*, an entity, a suffering human animal, whose recovery depends in the final issue upon how far it is possible to re-awaken and redirect the inherent forces which sustain and maintain life.

## V.

In almost every individual suffering from protracted disease the problem is complicated by disorderliness in the mental and emotional spheres. Unless these are reckoned with, and the springs of thought and action, and especially of feeling, set in order, balanced, rendered more normal and effective, a large part of any distressing conditions persist. The feelings and emotions, disordered as they also are, need full consideration, skilled interpretation, and sympathetic direction. The mind may be clear and efficient in some respects, but in others is not, hence should be put into splints, rested, soothed and restrained.

Especially are responses to psychophysical stimuli from within liable to be misinterpreted, the more important ones subordinated and the lesser ones exaggerated. Some grave derangements produce no conscious distress; at least, awareness has not yet arisen to the foreground of consciousness. Disturbances thus established between receptivity and determination have then become more or less dulled and automatic. They exert a persistent effect on the balance of forces, aggravating any existing minor departures from the normal. Disorders, so set in motion, vary in proportion to the progressiveness of the functional eccentricities and the susceptibility of the consciousness, its propensity to go astray, or aptness to dominate the body processes; in short, complex diseased states depend for solution upon the obedience of the body to the directing agencies, conscious or intuitive.

The whole problem of nutrition is shown to depend largely on how food is prepared, selected and above all, masticated. So skin hygiene, consistently utilized, is capable of more than conservation, even of radical reconstruction. Facts brought accidentally to personal attention have led to the securing of unexpected and gratifying results by this means in chronic muscular pains, chronic kidney disease, in gout, in circulatory disorders and diseases of the central nervous system. A damaged kidney, for example, is often nor-

mal in parts, and to its ability to regenerate there is no definite limit.

Water externally is only second in importance to water internally. The history of spa treatment furnishes massive evidence. Bowel irrigation not only cleans out the lower bowl, but also furnishes the best and simplest relief from poisonous effects in many forms of bladder and kidney disorders. This action of alkaline colon-flushings to increase the flow of urine is really invaluable. It furnishes an excellent remedy in many chronic disorders where the heart and kidneys are competent and kidney insufficiency is a feature. Of course, one should be careful to avoid overmuch of fluids in chronic Bright's disease, and states of high blood-pressure with a weak heart.

Respiration, commonly regarded as merely an automatic function, is capable of education and development into a potent agency for conservation and reconstruction, as the Yogis, of India, and irresponsible enthusiasts elsewhere have abundantly demonstrated. Experience with systematic respiratory education has been gratifying, especially in strengthening bedridden, lame, or otherwise handicapped folk. The use of breath regulation in chronic cardiac disease is remarkably effective.

## VI.

This brings us anatomically to another auxiliary agency, increased elasticity of the joints, ligaments, and other mobile structures as a factor in sustaining and restoring vigor. To secure results from respiration, obviously the chest structures must become normally elastic, and also the abdominal muscles must preserve normal tone—they very rarely do. Here educational exercises are required and accomplish much more than many clinicians realize.

## CONCLUSIONS.

1. In chronic disease the organism as a whole becomes exhausted through protracted, complex derangements; hence, reparative agencies are at a disadvantage as compared with the normal poise and efficiency of the organism when acute disease or injury occurs.

2. Therefore, the pathology of chronic disease is something much more than that of acute states, involving many problems of morbid physiology and psychic disorder yet unsolved.

3. Remedial measures must be directed to the restitution of functional poise and should include all those rational measures capable of conserving and enhancing the autoprotective and autoregulative forces.

4. The basis of relief and cure is to be found along the line of palingenesis (development according to the primitive or original

method) ; also the overcoming of agencies which retard physiologic processes,—rehabilitation of all functionally deranged organs, regulation of all contributory factors in vital action, so that full compensation shall be achieved consonant with all existing damage-ments.

5. The utmost drugs and medicines can do is to contribute to these desirable effects, however nearly they may approach to the rôle of 'specifics,' for overcoming disease entities, unlocking the doors for toxic wastes, and freeing the organism as a whole from disabilities present.

6. The measures on which, in the final count, we can chiefly depend are included under the term *personal hygiene*: (a) Conservative personal hygiene; (b) constructive personal hygiene, and especially (c) reconstructive personal hygiene.

7. The possibilities of reconstructive personal hygiene, in addition to the cure of existing disorders, lie in the direction of making available latent, undeveloped energies in any child or adult below the normal, from whatsoever cause; in systematically utilizing the inherent dynamics, and in raising the coefficient of efficiency.

8. We would call special attention to the fact that much can be achieved by bringing into line the latent functional power of impaired organs and tissues so as to secure the completest transformation of dynamic into kinetic energy, no matter what morbid agency co-exists.

9. Special vigilance is urged upon clinicians in restoring tissue elasticity, mobility, normality in the hydrostatic mechanisms; in amplifying the functional powers of respiration, circulation, urination, the skin, etc., and in affording support for relaxed structures.



## FAMILY ALBINISM.

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Heredity as a cause of disease is one of the most abstruse problems met in the fascinating study of medicine. Family or ancestral inheritance is still that dark abyss into which only occasionally a ray of light penetrates to help us in unravelling the laws of dependent individuality and inherited peculiarities. Abnormalities may descend directly from a grandparent or parent to all of the offspring, through the male line alone, the female line only, through both sexes, some of the remaining children being exempt, or a like peculiarity may be observed in a distant progenitor in the direct line or in an indirect ancestor.

Before taking up the main portion of this article, family albinism, which is certainly an inherited abnormality, let us review hastily the Mendelian theory of heredity and also mention a few family peculiarities as they pertain to the cutaneous system.

Mendel, in his epoch-making experiments, formulated his laws in the beginning by his study of the combining characteristics of thousands of plant specimens. He took a pair of varieties of the edible pea, of which one was tall and the other was short; these two were crossed together. The cross-bred seeds thus produced grew into plants which were always tall, having a height not materially different from the pure tall variety. From the fact that the character, tallness, appeared in the cross-bred to the exclusion of the opposite character, he termed it a dominant characteristic; dwarfism which disappeared in the plant, he called recessive (regressive). The next generation of this plant, when grown, was found to have a mixed character, many being tall, some being short, like the tall and the short grandparents respectively. It was discovered that the proportion of each variety averaged about three tall to one short, or in other words, 75 per cent. dominants to 25 per cent. regressives. It was found upon further fertilization of those plants having the recessive characteristics that the offspring were entirely of recessives.

Dominant characteristics will in general be recognized as such from the fact that they are transmitted through affected persons only. The dominants will have, as a rule, one parent affected with the peculiarity and one parent free from it. It is then to be ex-

pected that the children of such dominants, resulting from their marriage with unaffected persons, will be in equal numbers affected or normal. As a type of skin anomaly showing dominant characteristics may be mentioned tylosis palmaris and plantaris. Gosage considers that the following skin and hair abnormalities at times act as dominants: epidermolysis bullosa, xanthoma, multiple telangiectasis, hypotrichosis congenita familiaris, monilithrix, porokeratosis, inherited edema, etc.

Recessive characteristics will be recognized by the fact that they may appear in the children of parents not exhibiting such phenomenon, and especially among children born of consanguineous marriages. According to Bateson, from what is known of the genetics of albinism in other types, we should on analogy expect it to be recessive in man. The frequency with which albinos have proved to be offspring of related parents, especially of first cousins, justifies us in definitely inclining to the belief that albinism in man is a recessive character.

Albino, as a descriptive term, was first used by the Portuguese to indicate a white Moor. The condition has been known for many generations; thus we find this peculiar anomaly mentioned in the writings of Pliny and Herodotus. In complete albinismus the skin of the entire body is milky-white, with usually, however, a pinkish tinge due to the integumentary blood supply. The hair is very fine, soft, and white or whitish-yellow in color, although in exceptional instances, as recorded by Folker, it was bright red. The irides are usually colorless, pinkish or light blue, and the pupils, owing to the absence of color in the choroid, are reddish or pinkish. The absence of pigment in the eyes gives them a lack of resistance to light, which causes photophobia and nystagmus. The skin is normal in structure and function, except for the complete absence of pigment. The condition is permanent, although Ascherson, Phoebus, and Mayer have observed exceptional instances in which the pigment partially returned. In Mayer's case the red color of the iris disappeared from year to year. The affection is apparently more frequently observed in dark-skinned individuals. The anomaly has been widely observed, particularly in the tropical countries.

The affection is frequently observed in several children in the same family. According to Geoffroy Saint-Hilaire it is of more frequent occurrence in females than males. Apparently families presenting cases of albinism have had a large number of offspring. This may be a coincidence or may possibly be explained by the fact that the negro races are more prone to this affection and they normally have large families. In the cases reported by Marcy, the father and mother were full-blooded negroes, the first two children, males, were black, then came two females, both albinos, then another black female child, and the last, the sixth, was a male albino. In Folker's

cases (Caucasians), in addition to an albino girl with red hair, there were two other children of the pure albino type, the other offspring (five in number) were normal; the father and the mother were of the normal coloring. Sym observed a family in which four of the seven children—the first, third, fifth and seventh—were albinos; the parents and other relatives were normal. The irides in three of the four affected children were blue.

Lesser mentioned a family of seven children, of which six were without pigment. Pickel recorded thirteen children in a family of whom seven were albinos. Mayer observed that the second and fourth children in a family of four offspring were without pigment. Magnus tabulated a series of ten albino pedigrees; one of these contained a family of which seven were stated to be albinos and only one had cutaneous pigment. Boyle mentions several incomplete examples of albinism among the blacks of Borneo, whose skin was of a dirty-white color, interspersed with large freckle-like spots; the "color of the hair could hardly be described," the eyes were pale blue. The parents of Boyle's case were normal but his brothers and sisters were albinos, and many of his ancestors were said to have had the same abnormal lack of pigment. According to Burton, in West Africa there is occasionally observed a condition which might be termed semi-albinism, in which the skin varies in color between the natural hue of blacks and whites.

In a case mentioned by Schlegel the grandfather was an albino. Crocker refers to the fact that in some tropical countries, such as Loango, Lower Guinea, albinism is said to be endemic. At a medical meeting held in the Leeward Islands, in 1892, A. P. Boon showed two albino negroes, and the father related that his uncle's wife always bore twins, one of which was white and the other black. Hyde referred to twin albinos, children of Irish parents, treated in his clinic. Kneeland mentions two albino children in the same family with a black child born between them. Jeaffreson cared for a family in which the fifth and seventh children among eight offspring were without pigment. A very interesting example of the tendency in certain instances to revert to the original color is recorded by Stedman, to the effect that an albino negress married to a European had children who were all mulattoes. Numerous other examples of the prevalence of albinism and particularly its family tendency might be cited, but those mentioned will suffice to substantiate the grounds for the assumption that it is an inherited characteristic.

Some scientific men state that the albinos once constituted a separate race, and the characteristics are atavistic in character. Blumenbach, Winterbottom, Sprengel, and Otto considered albinism to be a disease or the result of disease. Lecat attributes it to the influence of heat; Mansfield and others to maternal impression.



The latter theory is very prevalent in the Philippines, as is also the theory that it is due to the morbid imagination of the mother during the period of pregnancy. The consensus of opinion now seems to be that the condition is due to faulty development of the pigment-producing apparatus.

According to Saint-Hilaire three varieties of albinism exist: the complete form, in which the pigmentary matter is entirely lacking; the partial form, in which the pigment exists in some places and is absent in others; and the incomplete form, in which pigment exists in all parts, but in quantity below normal.

Montinola believes that the disease is of neuropathic origin and that in all cases the condition can be referred to defects in the nervous constitution of the ancestors. Hurley collected 10 cases, in which he found that consanguinity was an important factor. In some cases the relationship was so close as to include the parents in the same family.

Heiser and Villafranca have recently written an interesting article upon the prevalence of albinism in the Philippines. They mention that the Director of Health in the Philippine Islands, for the fiscal year ending June 30th, 1910, tabulated 45 albino cases. Of this number 22 were classed as complete, 8 as partial, and in 15 the degree of the affection was undesignated. Heiser and Villafranca in their exhaustive investigation tabulated 198 cases of albinism. They found in their series of complete albinos (86 cases), feeble mentality in but 7 instances and impaired physique in 2. One or more relatives of these complete albinos were affected with this lack of pigment in 36 of the 86 instances; 44 out of the 76 partial albinos and 33 out of the partial or complete, unstated, albinos gave a history of other cases in the immediate family or among close relatives. In other words, 113 out of 198 instances of albinism showed hereditary influence.

Of the 45 cases appearing in the Philippine Islands Health Reports, 9 of the 22 of the complete type, were of poor mental development, while 2 out of the 8 partial albinos were mentally feeble. Four of 22 complete albinos were physically weak, and 3 of the 8 partial albinos were likewise of poor physique. Nineteen of the 22 complete albinos had other relatives attacked; 5 of the 8 partial albinos gave a like history. In this series of 45 cases, there were 18 instances of photophobia, 13 cases of nystagmus and 3 of myopia.

During the last few years I have had the unusual opportunity of observing two interesting albinos families in the skin dispensary of the Pennsylvania Hospital. The first family with the affection was exhibited before the Philadelphia Pediatric Society on February 11th, 1913; the second has been under observation during the past year.

The first family consisted of seven boys, four of them normal and

three of the typical complete albino type. The youngest, third, fifth and seventh boys are intelligent and with the usual pigment development. The second, fourth and sixth sons have pink eyes and all the associated symptoms of albinism. The parents are Italian with blue eyes and rosy cheeks, the picture of good health. No cases of this affection could be determined among the antecedents. Two of the albino boys exhibited normal intellect; the third, however, was somewhat of the cretin type. Photophobia and nystagmus were marked in all three boys.

An interesting history was obtained from the second albino family. The parents were of the ordinary Russian Hebrew type, first cousins, coming from a family of about five hundred persons all living in the same small town in Russia and always intermarrying. The great-grandmother was the only known ancestor with this affection. The mother has had ten pregnancies (two miscarriages); three of the eight children were albinos. The first four children were normal, the fifth was an albino, the sixth was normal and the last two were without pigment. One of the latter children died when five weeks old of summer complaint. The normal children are all well and strong. Those without pigment have always been weaklings and almost always sick. Photophobia and nystagmus are marked symptoms in the two without pigment.

Albinism is by no means restricted to the human race since the plant, fish, bird, mammal and animal kingdoms show many examples of the affection. As examples of these may be mentioned white monkeys, moles, ferrets, guinea-pigs, rats, cats, mice, rabbits, elephants, reed bucks, and others, white crows, blackbirds, robins, martins, swallows, sparrows, parrots and ducks, and also the silver varieties of gold fish.

The writer is inclined to agree with Bateson's exemplification of Mendel's principles of heredity, that in certain instances, at least, albinism should be classed under the recessive type of inheritance. In a recessive type there is recognized the absence of some ingredient which is present in the normal body. Albinism is almost certainly due to the absence of at least one of the factors, probably a ferment, which is needed to cause the excretion of pigment.

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## HELIO THERAPY IN COLORADO.

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The action of sun baths in treating disease is now fairly well understood by many physicians, thanks to a number of excellent articles which have lately appeared in several medical journals. However, a brief description of the scientific facts now known in regard to the action of the solar energy upon the human body may be helpful.

The rays of the sun falling on the skin of one of the white race produce first a congestion, followed by an irritation or burn if continued long enough. This first congestion, if not carried to the point of irritation or destruction of the outer layer of skin, is of benefit to the body in several ways. The cutaneous vessels are dilated, internal congestion is relieved, the general circulation of blood and lymph is stimulated, the heart's action assisted and the kidneys and skin are encouraged to act more rapidly. In this way the metabolism of the body becomes more active, as both the absorptive and eliminative powers of the cell are increased.

As the heat rays falling on the skin produce an increased flow of blood to the part exposed, antibodies that combat disease are formed in excess of the normal, hemoglobin is increased and the blood count shows an increase in the number of red cells. These effects can often be observed by the use of different baths or massage, which tend also to cause a superficial congestion; but in using the solar energy on the skin there is another force which, perhaps, is more potent and far-reaching in its effect on man than all the other rays together, and these are the actinic, or ultra-violet rays, called also the dark or chemical rays. Although these rays from the sun cannot be seen, they exist in the sunshine and have a powerful effect on all cellular life.

The actinic rays falling on a white skin are nearly all reflected back and do not penetrate, but when the white skin becomes bronzed from deposit of pigment this pigment acts as a transformer to the actinic rays and they then pass freely into the skin. The actinic rays, now allowed to penetrate into or through the skin, act on the corpuscles of the blood, present in large numbers in the dilated cutaneous vessels, stimulating and vitalizing them before they are



carried by the general circulation to all organs and tissues of the body.

Another condition present during the treatment by sun baths, and one often overlooked, is the reflex action induced by air moving on the surface of the body. This reflex, or stimulation of the nerves of the skin, is a factor of much importance, and affects metabolism in a decided manner, as our skin, having been protected by clothing for many generations, has become physiologically inert, and the air bath is of itself of much assistance in giving heliotherapy, and like it a tonic to the body, possibly because in the 'outdoor cure,' in giving



Fig. 1.—Tuberculosis of lungs and spine. Advanced case.

fresh air to the lungs and sunlight and air to the skin, we are merely returning to the primitive environment of the human race.

In using heliotherapy in Colorado there are some climatic conditions that have a more or less important bearing on the therapeutics of sun baths. At an elevation of a mile above the sea level, Colorado has a dry, thin air. The sunshine being a very constant factor, the treatment can be given in a regular and systematic manner, without the annoying interruptions of cloud, fog or rain, so common in many damp localities that they often interfere for days at a time with the daily use of sunshine.

The rays that constitute the effective force in the sunshine, the actinic rays, are all absorbed by a dense atmosphere, so that over cities and in the damp lowlands in general these valuable rays do not reach the patient but are nearly all dissipated by passing through thick and humid air, while in dry, thin air, such as Colorado pos-

sesses, the actinic rays pass quite freely to the patient and exert their curative effect. Thus, the 'dose' of sunlight in Colorado can be given regularly, the dose is more efficient in a given time on account of the presence of actinic rays, and, moreover, the dry air surrounding a patient while taking a sun bath prevents the enervating effects due to humid heat, at the same time allowing a free exposure during cold weather without chill or danger.

In treating tuberculosis by heliotherapy the brilliant results obtained in bone and joint tuberculosis have rather cast into the shade the results of this method in pulmonary tuberculosis. The comparison, however, is not a fair one, as in one form of the disease the invasion is local and can often be arrested by drainage, with proper apparatus to insure rest; while in the other, vital organs are

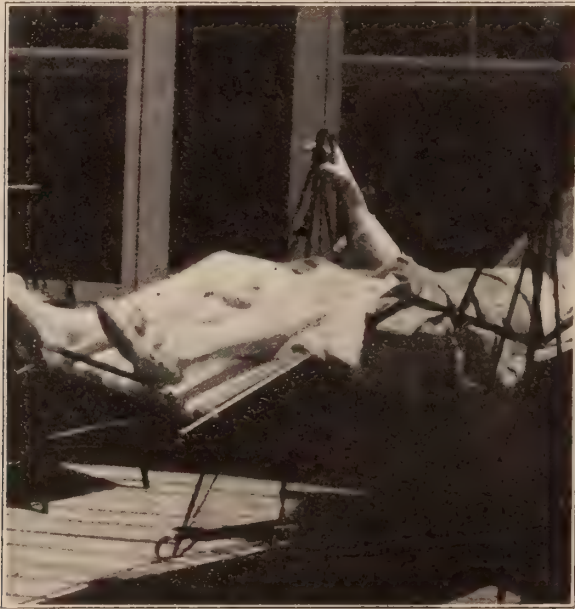


Fig. 2.—Albine taking the first sun-bath.

attacked, poisons are easily taken up by the blood, rest is difficult to accomplish, drainage is often imperfect and metabolism disturbed, so that we cannot reasonably expect as good results from heliotherapy in pulmonary tuberculosis as in tubercular bones or joints, and the comparison between the two conditions is not a fair one.

If the patients with pulmonary tuberculosis are given the benefit of careful selection, and heliotherapy is used with patience and caution, not expecting rapid results, it will no doubt be found that the sun bath is a measure well worth the trial. The directions to patients are as follows—

1. Protect head and neck by shade of building or a white hat.
2. Wear amber-colored glasses.
3. Use reclining chair or couch.
4. Have a free circulation of air but avoid cold winds.
5. The hours between 11 a. m. and 3 p. m. are the best.
6. First day expose feet and legs to knees for five minutes.
7. Second day the same.
8. Third day for ten minutes if skin is not hot or inflamed. Have physician see skin before taking more baths.
9. Gradually increase the area exposed to the sun.
10. First legs, then abdomen, then chest and arms, turning over so as to expose back also.
11. Take temperature before and after bath. If there is elevation of temperature, headache, nervousness or fatigue, report to your physician before taking another bath.

As to the selection of patients with pulmonary tuberculosis for sun treatment, there is apparently no rule than can guide us in all cases. There are undoubtedly certain individuals who will not react favorably to such treatment, who will, in spite of the utmost care and caution, have irritation of the nervous system, headache, restlessness, or rapid pulse and temperature after a brief exposure. This can be judged only by a trial.

There are two types among the tubercular invalids that are supposed to be most unfavorable subjects for sun treatments: those with advanced disease of some years' standing who are having daily temperature, and the blonds who have thin, white skins and form blisters instead of pigment in the skin from sun exposure (Fig. 1). In the first class I have a patient who had been in Colorado for three years, lived in the open air day and night, was carefully watched, given proper food, and was completely at rest. There was involvement of both lungs with cavity formation, sputa 6 oz. in twenty-four hours, T. B. present, rapid pulse, p. m. temperature 101° F., loss of weight 20 lb., tubercular spine with deformity, a large abscess holding about two quarts on left hip, due to the spinal disease, much pain. Condition had gradually grown worse from year to year. No change was made in food, air or rest, but heliotherapy was tried. As the illustration shows, the body, after eight months of exposure, is dark bronze in color. The physical signs show fibrosis and retraction in both lungs, sputa one ounce in twenty-four hours, pulse 80, temperature normal, gain in weight 16 lb., abscess from spine absorbed without opening, no pain on walking, spine fixed at point of deformity. It is hard to believe that the sun baths did not produce the change for the better in this patient's condition, because it was the only change made in her treatment after three years of all that climate and sanatorium treatment could do for her disease.



In regard to the thin-skinned blond type, I have under treatment a gentleman of thirty-four years with an extensive involvement of left lung, small cavity at apex, who has been ill for one and one-half years, loss of flesh 16 lb., sputa 4 oz. in twenty-four hours, streaked with blood, T. B. present, p. m. temperature 101° F. X-ray confirmed physical examination. This patient is really an albino with perfectly white hair, very white and thin skin that burns easily from slight exposure to the sun, eyes intolerant to light. There being but little improvement in his condition after some weeks in Colorado, I decided to try helio-



Fig. 3.—Sun-bath at pavilion for children. Tubercular knee, kidney and spine.

therapy, although such an extreme instance of the blond type seemed unfavorable to the experiment. I therefore used more caution than usual, protected the head by deep shade, the eyes by amber glasses, had the pulse and temperature taken both before and after the bath. I exposed the feet only for five minutes the first day, then the lower part of the legs for five minutes the next day; when the skin became hot and tender I waited a day or two for this to subside, never allowing the skin to become unduly inflamed, congested or blistered, so that no desquamation occurred and no generally unfavorable reaction was noted. Gradually during three months the whole body except the head has been exposed. There has been no bronzing or pigment formed in the skin, but in its place a curious chronic congestion has occurred, dark red with a faint blue color

in places. This is not painful or hot, but it is constant and remains the same from day to day, gradually disappearing after ten days when sun exposure is discontinued. This seems an effort of nature to mass the blood on the surface in place of pigment, so that the skin is not white but dark red, and probably the actinic rays pass through this darkened skin as they do when pigment is present, thus, in the blond types, reaching the blood corpuscles by this method without the pigment being present.

The change in this patient under heliotherapy has been most gratifying. The physical signs have improved, no moisture is heard over the lung, cough and expectoration have practically



Fig. 4.—Tuberculosis of knee-joint. Six months heliotherapy; cure.

ceased, weight has increased 20 lb., and temperature is normal. This improvement could have resulted from the usual climate and sanatorium methods employed without the use of heliotherapy, but the fact remains that a rapid and satisfactory improvement did take place in a blond of extreme type while taking sun baths every day, that the sun treatment was not injurious, but on the contrary, seemed to be of benefit, was not followed by unusual rise in temperature or pulse and no nervous symptoms developed, due to the exposure.

#### CONCLUSIONS.

Heliotherapy is now on a firm, scientific basis and will prove of value in treating pulmonary tuberculosis if used with caution and patience.

Advanced cases and those of the extreme blond type will occasionally respond favorably to sun baths.

In Colorado the sunshine can be used with regularity and the effect is enhanced by the large percentage of actinic rays, while the dry air on the skin tends to protect the body from heat exposure.

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## CANCER OF THE STOMACH.

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This short article is not for the purpose of bringing out anything new, but solely to emphasize several very important points—namely, the difficulty of diagnosis, the relative importance of the various diagnostic means, and the importance of exploratory laparotomy under local anesthesia, even in apparently hopeless cases.

It is generally admitted that beginning carcinoma of the stomach is one of the hardest conditions to recognize with certainty, even sometimes with the lesion exposed by an operation. It has seemed to me that inoperable carcinoma is almost as baffling, if not a little more so. Cancer engrafted upon an ulcer may be confused with simple chronic, indurated ulcer. Diagnosis between cancer and achylia with pernicious anemia is often most troublesome, but the hardest cases with which I have had to deal are empyema of the gall-bladder. In all these conditions we may have absolutely similar histories, symptomatology and objective findings. I shall briefly report several cases and then draw further conclusions from them.

CASE I.—W. V. P., *æt.* fifty-three, store manager, married; was seen October 9th, 1913. Family history was negative, and his own health had been perfect up to the onset of the present illness, eight months previously. The symptoms were first intermittent and later became constant, and consisted of aching, pain and tenderness in the right hypochondrium and epigastrium. He had lost 25 lb. He was a sick-looking man of rather cachectic appearance. The liver extended nearly a handbreadth below the costal border and was exquisitely tender even over the epigastrium. A hard mass could be felt below the liver and attached to it and there seemed to be a nodular condition. There was considerable gas. Temperature was 100° at night, pulse 80, blood-pressure 170 mm., white blood count 17,500. Examination of the stomach contents showed absence of HCl and stool was strongly positive for occult blood. The *x*-ray showed some distortion about the pylorus, but nothing definite could be made out.

A diagnosis of primary cancer of the stomach with secondary cancer of the gall-bladder and liver was made, based on (1) the character of onset in a man above forty who had never previously had indigestion, (2) the type of symptoms, (3) the mass which felt hard and nodular; (4) absence of HCl with occult blood, (5) the fever and white blood count which would be found in degeneration of a malignant mass, and (6) the indefinite *x*-ray confirmation of something wrong about the pylorus. Operation revealed an empyema of the gall-bladder.

CASE II.—S. K., Hebrew, *æt.* fifty-three; consulted me March 2nd, 1915. Mother, brother and sister had died from cancer. He had had stomach trouble for twenty years, with epigastric pain and vomiting, and acid stomach suggestive of ulcer, intermittent but with a nearly constant epigastric ache lately. He had lost a good many pounds in weight and his appearance was cachectic. There was a distinct mass extending from the gall-bladder region nearly to the navel, only slightly tender, moderately hard, not nodulated and feeling like a sharp border. The urine showed the faintest possible trace of albumin, a trace of bile, +2 excess of indican, and marked urobilinogen reaction. Stool showed faint reaction for occult blood. The stomach contents showed some hypersecretion, changed blood flecks, free acid 44, total acid 54, many white blood cells and moderate number of red blood cells. The *x*-ray examination showed constant and definite finger-print deformities about the pylorus.

Here we have a strong hereditary history, symptoms suggestive of ulcer becoming carcinomatous, occult blood, blood flecks in the vomitus, loss of weight and cachexia as well as positive *x*-ray diagnosis. Although the similarity of the first case was borne in mind, still a diagnosis of primary cancer of the pylorus with secondary cancer of the liver was made. Dr. Christie, who made the roentgen study, said that if we could not diagnose cancer from the study of this case it could never be done from the *x*-ray. The patient refused operation and consulted half a dozen other physicians, all of whom told him that he had gall-stones, but none of whom made a complete examination. The patient disappeared from my direct observation, but I know that he is still alive, thirteen months later.

CASE III.—H. L. A., *æt.* fifty-four; had been ill for nearly a year before consulting me, and during that time had lost 35 lb. His family history was bad, his mother, brother and sister having had cancer. His trouble was first intermittent, but had been constant lately and consisted of epigastric pain coming on about one hour after meals, followed by chilly feeling and perspiration.

He was an ill-looking man. Abdominal examination showed splashing sound extending to the navel and more marked on the left side. A large firm mass could be felt running down from the lower border of the liver nearly to the navel. It seemed rather smooth, slightly movable and somewhat tender. Several bean-like bodies could be felt under the skin in various parts of the body. They did not seem to be glands and some had been present for many years. His blood-pressure was 95 mm., hemaglobin 75 per cent. and white blood count 11,200. Examination of his stomach contents showed free HCl 54, total acidity 60 and a proteid reaction of 1 to 80. Radiographic examination showed an atonic, moderately ptosed stomach, large, of normal mobility, weak peristalsis, and slow evacuation. There was a constant deformity of the antrum, and fixation of the pylorus with obstruction. There was also constant deformity of the duodenal cap with obstruction. The report was that the signs pointed to carcinoma.

Here we had sudden onset in the cancerous age, a marked hereditary history of cancer, loss of weight, presence of a mass, etc. The similarity of these symptoms to those in the two former patients caused me to hesitate as to the diagnosis. Then the duodenum being apparently involved, according to the *x*-ray, made cancer more im-

probable to my mind, since this condition rarely goes across the pylorus.

It was explained to the patient that he had a mass in his abdomen which might be malignant or might be due to gall-bladder disease. An exploratory operation was advised as being indicated in either instance. Operation under local anesthesia revealed a dilated hard gall-bladder bound with firm adhesions to the duodenum and pylorus. Nearly half a pint of thick creamy pus and many gall-stones were removed. He made a speedy recovery.

These three patients presented a complete picture of what we would expect in rather far-advanced carcinoma, two of the primary type and one secondary. Now let us contrast the history of several patients who died from cancer.

CASE IV.—J. M. B., *æt.* seventy-nine; never had gastric symptoms until a year before consulting me, in April, 1915. He complained of fulness in the stomach, oppression after eating, gas in the stomach, weakness in the legs, and loss of a few pounds in weight. These symptoms are not as suggestive of cancer as those presented by the other patients, nor had there ever been a case of cancer in the family. Abdominal examination showed spare, scaphoid abdomen, with recti relaxed but irritable. There was slight tenderness across the mid-epigastrium as of a mass, but it could not be definitely mapped out. Occult blood was present in the stool and the *x*-ray showed a small stomach with a constant deformity near the pylorus and rapid emptying. Probable annular carcinoma was diagnosed and exploratory operation under local anesthesia advised but refused. Patient died in a few months.

CASE V.—F. D., *æt.* sixty; did not know what an ache or pain was until the onset of the present illness, a few months before, during which time he had lost 40 lb. His principal complaints were sleeplessness, restlessness, weakness, nervousness, and a heavy ache, not severe, in the stomach, worse at night. An indefinite feeling of a mass was felt about the navel. His diagnosis of cancer was confirmed by death in a couple of months.

One more history to show that duration in cancer may be so great as to lead one to question the diagnosis:—

CASE VI.—M. M., *æt.* sixty-two; had bilious fever when sixteen but no other illness. He had been ill for one and a half years before consulting me, complaining of loss of weight, 25 lb. in two years, and an uncertain ache in the epigastrium for one year. He was rather cachectic looking. An indefinite feeling of resistance was obtained in the upper epigastrium just below the xyphoid, but no distinct mass. The stomach tube obtained bloody mucus and a small bit of cancer tissue, and the radiograph showed an infiltrating mass about the pylorus. He worked for six months after this, and died several months later.

Pain is described as one of the cardinal symptoms of cancer. In the great majority of my cases pain has not been an important factor. Most patients have complained of some discomfort, but it is usually relatively unimportant. The three patients first described, who had cholecystitis, did have real pain, and it seems to me that a marked degree of pain would lead me next time away from the diagnosis of cancer, in spite of some other suspicious findings. Sudden onset of symptoms, after middle age, in one previously



without indigestion, is a strong point in favor of primary cancer, but these patients show that it is not an invariable indication.

The second point which I wish to bring out is in reference to the *x-ray*. Valuable as is this part of the examination, it should not be allowed to outweigh other clinical evidence. A positive diagnosis was made by an expert radiographer in two of the first three patients and the other was viewed with suspicion. I am aware that Cole, of New York, claims to be able invariably to eliminate cancer as a possibility by means of serial radiography. Most patients, however, cannot afford the great expense connected with this procedure, nor can many patients avail themselves of the expert opinion gained by such a worker from his enormous experience. Speaking in general, therefore, these statements as to the value of the *x-ray* will hold out. I will just emphasize one finding. If the duodenum seems to be involved, a probability of adhesions or chronic deforming ulcer is greater than that of cancer. Again, the very rapid emptying of the stomach through an apparently fixedly open pylorus is even more suggestive of malignancy than is retention.

Lastly, and most important, is the matter of treatment. I believe firmly that exploratory laparotomy, under local anesthesia, should be advised in every case, however hopeless it may seem. A diagnosis is not made in my office until the patient has had an exhaustive study, occupying several hours. In spite of such complete examination these cases illustrate the strong possibility of error. I am convinced that the tendency to be mistaken in cancer diagnosis, either pro or con, must be greater with the more cursory examination made by the non-specialist.

Many of our statistics are probably wrong. Death is not a definite proof of malignancy. If patients I and III had gone several more weeks without operation they would have died from sepsis or rupture of the gall-bladder, and their death would have been attributed to cancer. Exploratory operations saved their lives. No abdominal mass should be large enough, even with most convincing symptoms of cancer, to cause us to advise against operation as hopeless. Under local anesthesia the exploration may be done without shock, and if it is seen that nothing can be done for the patient he is no worse off than before. If a cancer is present which can be operated with some hope of success, or if another condition be found, ether may be administered and the operation completed.

In closing I will repeat that (1) cancer, whether incipient or inoperable, is a difficult malady to diagnose; (2) many cases are probably misdiagnosed, (3) the *x-ray* is not an invariable guide to correct diagnosis, (4) exploratory operation under local anesthesia is indicated in the apparently most hopeless conditions

## CONSTITUTIONAL MEASURES IN CUTANEOUS MEDICINE.

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There has been prevalent from early Egyptian times the idea that skin diseases need some form of internal medication. St. Anthony's Fire (erysipelas) was found to demand a powerful drug to drive out the possessing demon, and stress has time and again been laid upon the importance of giving some medicine by mouth to purify the blood, no matter if the lesion is purely a local one. On the other hand, the skin above all systems of the body has held a natural claim to the local application of myriads of salves and lotions; frequently the skin when it was healthy has been made diseased by these powerful applications. Now the province of this paper is to point out in a general way what skin cases need internal treatment and incidentally what ones need both internal and external forms of treatment.

Even physicians have been giving to certain cases of skin disease internal treatment where it was in no way indicated; perhaps less frequently they have erred in the other direction by omitting to give the internal treatment when it should have been given. Likewise, local applications have been made by doctors where there was no good reason to do so, and on the contrary no local measures adopted when they should have been. It is even possible to imagine both forms of treatment given when neither was indicated, or the neglect of any treatment when both should have been used, and this in the hands of men supposed to be proficient.

So we find it that it is well to use the light that has been shed on the nature of these diseases, in order that there be reflected a rational regime of treatment for each class of cases and for each individual case. Always try to 'size up' the make-up of your patient.

To begin with, the acute exanthemata, which are really constitutional diseases with skin manifestations, need as a rule constitutional treatment alone, or very little local interference.

Measles, smallpox, and scarlet fever demand isolation, ventilation, measures to reduce fever (as sponging), and symptomatic handling, as, for example, the employment of ammonium chloride for the cough of measles, nose and throat washes (a form of local treatment), and the use of diuretics in scarlet fever, stimulation and care of the eyes as indicated in smallpox and roborant ex-

pectant measures as called for. During the later stages, healing of local lesions and desquamation may be helped by iodine on the one hand and bland ointments on the other. Purpura, in its various forms, needs constitutional management and not local. Erysipelas demands strychnine, iron and quinine, and in addition local applications, as lead water and laudanum, 20 per cent. ichthyol solution, 1:20 salicylic acid, saturated solution of Epsom salt, etc. The mild contagious diseases with skin eruptions, German measles, chicken-pox, for example, require practically no treatment in a child, as a rule, except bed. Painting the lesions of varicella with iodine and anointing with carbolized vaseline or calomel ointment, or using a dusting powder, may lessen the scarring. Fumigation, especially with plenty of fresh air, is to be remembered in handling these particular cases, and proper quarantine measures carried out to prevent spread of the infection.

Typhoid, typhus and epidemic cerebrospinal meningitis are also examples in which we have not a skin disease primarily to handle but skin eruption consequent upon the general disease.

Syphilis, tuberculosis cutis, yaws, etc., are chronic affections in which proper applications to the lesions may tend to alleviate the attack, but constitutional measures are paramount.

Now coming to the real skin disease, in handling all so-called skin affections, with much itching or burning, we must give the patient prompt relief. This is done by the administration of acetanilide (gr. V to VIII), antipyrine, phenacetine, salicylates internally, and menthol or thymol lotions may be tried. Such diseases as pruritus, eczemas, burns, lichen planus, mycosis fungoides, dermatitis herpetiformis demand an internal medication. Endeavor to get at the cause of a skin lesion in order to give the best relief.

The salicylates are found useful too in purpura, rheumatic and throat cases accompanied by skin lesions and dermatitis herpetiformis perhaps (though arsenic is best here). Some lesions, as those found in pregnancy and the puerperium, will disappear with the termination of the physiological process with which they may be associated.

Syphilitic eruptions of course depend for management upon the proper administration of neosalvarsan, salvarsan, mercury, iodides.

Tuberculosis of the skin, scrofuloderma, pellagra need systematic upbuilding in the way of forced feeding. Diabetic skin eruptions depend for their treatment upon the correct dietetic measures employed in holding down the acidosis.

The gastro-intestinal tract is often at fault in certain skin affections, such as acne vulgaris, acne rosacea (found in beer and tea drinkers besides those exposed to the weather), eruptions on infants and young children, jaundice, etc. Magnesium sulphate internally is generally an efficient remedy in many of these subjects. Urticaria



also is cleared up by calomel and salts, as a rule, at times adding sodium bicarbonate and salicylate.

Herpes in different parts of the body is best treated by galvanism, a mild laxative, nerve tonics and dusting powder.

Arsenic is a much-abused drug in skin work. It is used in most everything from pemphigus to scabies. It is to be given in lichen planus, psoriasis, and pemphigus in full dosage.

Generally, the laity are prone to jump at once to medicine for boils, whereas the main thing to do is to antiseptinize the surface so as to prevent their spread. Brewers' yeast, bichloride of mercury, calcium sulphide, and arsenic have all been tried. In some selected obstinate cases vaccines have proved beneficial, as also in acne vulgaris. X-rays too have been tried in severe acne and eczema cases, and also for keloids, epitheliomas, lupus, etc. Vaccines have been tried for some of the fungus infections but with little encouragement.

While mentioning drugs, it must always be kept in mind that rashes can be caused by certain drugs—bromide, iodide, potassium chlorate, copaiba, arsenic (pigmentation and keratosis), quinine, atropine, antitoxin—and in these cases the drug must be stopped and a laxative given.

In dealing with trade eruptions and poison ivy (just as with hay asthma), it is wise to consider changing the environment of the victim as this may do much for him.

Among the rarer conditions helped by paying attention to general constitutional treatment, are anthrax and actinomycosis (needing support), blastomycosis (KI), hyperidrosis and bromidrosis.

In conclusion, whenever constitutional measures are used it is important that they be not abused.

## TWO INTERESTING CASES OF EXTRAUTERINE PREGNANCY.

By ROSS R. ANDERSON, A. M., M. D., of Salt Lake City.

CASE I.—In 1897 Mrs. R. J. missed her regular menstrual period. On December 26th, 1897, she had sudden acute pain in the left side which was followed by fainting. After the spell of fainting she was very pale and anemic and was confined to her bed for a period of three months.

In March, 1898, she began to have labor pains, so she took to her bed and had hard labor pains lasting three days when an after-birth the size of a placenta at full term passed the vagina. After passing the after-birth, the patient menstruated each month, but had pain and vomiting and was very weak but kept up and around most of the time.

In January, 1899, the patient was attacked with chills and fever, and while suffering a chill an abscess broke into the rectum and a large quantity of pus was passed. There were copious discharges of pus each day by the rectum until the following May when the patient passed a femur bone the size of a femur from a fetus near term. Various bones of the fetus continued to pass until October, 1899, when the last bone was passed. After October, 1899, the pus discharge from the rectum ceased and the patient gradually regained her health, except that she continually complained of more or less pain in her left side, backache, and occasionally a foul discharge from the uterus.

In January, 1913, I was called to see the patient who gave me the above history. Upon physical examination, I found a torn perineum and cervix, also hemorrhoids. There was a great deal of soreness in the left ovarian region, but no tumor mass could be made out on physical examination.

January 12th, 1913, I repaired the cervix and perineum, removed the hemorrhoids and did a laparotomy for adhesions. I found a small appendix all bound down by adhesions, numerous adhesions between the omentum and uterus; and lastly, an absence of the left tube and ovary with the left horn of the uterus adherent to the upper part of the rectum.

The tube and ovary had been destroyed at the time the pregnancy had become infected and necrosed into the rectum.

This case illustrates what nature can do in some of these cases of ruptured tubal pregnancy.

CASE II.—Mrs. G. A. G., *æt.* thirty-eight. Nationality Danish, occupation housewife. Past History.—Painful menstruation for several years past. February, 1912, had a curettment. Other history negative. Family history negative.

*History of Present Trouble.*—In August, 1912, the patient missed her regular period going ten days over her time. She then began to flow profusely, had severe pain in the right side followed by fainting.

The patient thought she was going to die and sent for her husband. Her husband gave her osteopathic treatments which she said revived her.

Several days later she noticed a mass in the right side low down in the abdomen, so her husband called a physician to see her. The doctor made a diagnosis of appendiceal abscess and advised operation, so she went to the hospital where the doctor removed an apparently normal appendix. At the

operation the doctors decided the mass in the right side was a pregnancy in the right horn of a bicornate uterus.

In November, 1912, I was called to the home of patient. Not knowing anything of the previous history, I went into detail concerning same and got the above history. I advised a consultation with the doctor who had operated upon her, but she informed me that the doctor had discharged her and she considered him through with the case, and insisted that I take charge of the case.

Besides getting the above history, I found the following subjective symptoms and physical signs. Severe pain and tenderness in the right side of the pelvic region and lower abdomen. No cough, no edema, no dyspnea. Digestion fair, appetite variable, no nausea or vomiting, no belching, some bloating, no heartburn, bowels regular. Patient very nervous.

General appearance poorly nourished, anemic, temperature  $102\frac{1}{2}^{\circ}$  F., pulse-rate 144, regular, tension normal, blood-pressure 120. Usual weight 130 lb., present weight 95 lb. Large mass in right lower abdomen.

Upon bimanual examination, I could plainly make out a slightly enlarged uterus to the left of this large mass that occupied the right lower abdomen and pelvis.

I made a diagnosis of ruptured tubal pregnancy that had become infected and advised an immediate operation. The husband called up the doctor who had operated the patient and told him my diagnosis and advice regarding operation. The doctor laughed at my diagnosis and told the husband that it would only be a matter of time until we would know, but the husband insisted upon further consultation. Several physicians saw the patient with this doctor and all confirmed his diagnosis of a normal pregnancy in the right horn of a bicornate uterus, so the patient was confined to her bed several months longer waiting to be confined. When the time came when she was supposed to be at about term, and certainly her abdomen was larger than a woman at term, the abscess broke into the rectum; so the doctor had her sent to the hospital and told her she would soon give birth to her child and she would then be all right. They remained in the hospital several days but no baby came, but the patient continued to discharge pus by rectum.

The husband finally came to me and asked me to take charge of the case. I told him after discharging the other physicians, I would be free to take the case. He did so, and I assumed charge.

I opened this large pus bag through the vagina under hyocine, morphine and cactine narcosis and let out several quarts of pus. The patient drained through the vagina for many months, during which period I frequently washed out the pus sac with iodine solution. The opening in the cul-de-sac closed up several times, which necessitated my opening it up again, which I did with curved hemostatic forceps without any anesthetic. The patient was so very low that I feared she could not stand an anesthetic, so I simply used the hyocine, morphine and cactine.

At the end of about fourteen months, I had reduced the pus bag from the size of a woman at full term to about the size of two closed fists, but it required Weir Mitchell rest cure, tonics, etc., and frequent irrigations through the cul-de-sac. I then advised an abdominal operation, which the patient eventually consented to after several months further waiting. I removed the remains of the pus sac or intraligamentous cyst that had resulted from infection of the blood clot and products of the ruptured tubal pregnancy, including the right tube and ovary.

The patient made an uneventful recovery.

From the beginning of her trouble (Case II) until she was entirely recovered covers a period of more than two years, which to



my mind was needless suffering by taking advice that proved erroneous. In this last case there were several physicians who saw the patient and all agreed she had a uterine pregnancy. I asked how they accounted for the chills and fever, leucocytosis, and other symptoms of infection. The answer received was that they were nervous chills, and that it was not uncommon to have a fever due to pregnancy.

To me the history was so typical and the signs and symptoms so textbook in character that I could not see how so many doctors could overlook the correct diagnosis. I feel that the mistake in diagnosis was due to a lack in care more than to a lack of knowledge and skill on the part of the consulting physicians.

I recite these cases not merely to criticise the doctors who erred in their diagnosis, for we are all liable to make mistakes, but to stimulate more interest in using all the aids we have at hand in arriving at a correct diagnosis, and to recount two unusually interesting cases of extrauterine pregnancy.

## MALIGNANT GROWTH IN THE NEWBORN.

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By HUBERT N. ROWELL, M. D., of Berkeley, Cal.

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Hemorrhage in the newborn, while not uncommon, is, nevertheless, a tragic occurrence and a condition the possibility of which confronts the physician in the conduct of every maternity case.

Eliminating syphilis, melena and hemophilia, the remaining causes of bleeding at this period are of unusual interest.

I append the details of an instance of fatal hemorrhage in the newborn, caused by malignant growth, which would appear unique and worthy of report.

Baby M. was born of exceptionally robust and healthy parents January 14th, 1916.

The mother, a multipara, having given birth to a healthy child two years ago, still living and well, enjoyed a normal and happy pregnancy and passed through a labor of four hours, with spontaneous delivery of the head in left occipital anterior position.

Twenty hours following birth the infant vomited blood which persisted, regardless of treatment, until its death on the evening of the 16th, forty-eight hours following its birth, and as it died copious discharges of dark blood appeared from the rectum.

Autopsy and pathological findings by Dr. Robt. Glenn of Samuel Merritt Hospital showed: Body of well-developed infant of two days. Heart, lungs, liver, spleen, kidneys and thymus, normal. Stomach of normal size, filled with clots. Organized clot in esophagus just above the cardia. Esophagus thickened, with hardened walls, in which are dilated and tortuous blood-vessels. Duodenum, jejunum, ileum and rectum filled with blood. Specimen consisting of a section of the wall of the esophagus measuring about 2 cm. in diameter, bearing on one margin a remnant of mucous membrane and on the other the smooth wall of the aorta. The most striking characteristic of the mass is its dense, brownish-black pigmentation.

On section the mass is found to consist almost entirely of fibrous tissue overgrowth, deeply impregnated with melanotic pigment.

*Diagnosis.*—Melanotic sarcoma.

## SUNLIGHT IN THE TREATMENT OF DISEASE.

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By J. W. KIME, M. D., of Fort Dodge, Iowa,  
Superintendent Boulder Lodge Sanatorium, Fort Dodge.

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After fifteen years' constant use of sunlight as a therapeutic agent, we are convinced that this force is but little appreciated as a remedial factor in disease, or it would be in much wider use.

In tuberculosis in its early stages, and in the pretuberculous stage, sunlight is a remedy of unequalled value. Indeed, we are convinced that if sunlight were properly applied in all early cases of tuberculosis, our results would be very much more satisfactory than they are now.

Our method of using sunlight at Boulder Lodge Sanatorium, in early pulmonary cases, is as follows:—

During the summer months the patients are exposed to the direct rays of the sun for half an hour each morning immediately after breakfast. The body is nude except for a garment about the loins. The head is kept shaded during the exposures. In winter the same methods are used, except that the patients are treated in their individual rooms, all of which have southern exposure.

In cool, or cold weather, the exposures are made for a longer period of time, for an hour or more in suitable cases.

In all cases the exposures are at first brief, five or ten minutes only, gradually increasing to the full allowance for each individual case.

We have at no time seen contraindications to the use of the light in early cases without temperature. In cases more advanced the sun bath not infrequently causes an increase of temperature, and if the light is then used it must be supervised with much care.

In addition to the general sun baths, in selected cases we throw a strongly concentrated blue light upon the bare chest for half an hour.

This light is reflected from a large concave mirror composed of many sections so arranged that the focus thus formed covers a space about the size of the adult chest. This blue light is rich in actinic rays, but poor in heat rays. We are thus able to utilize a comparatively cold light that has an abundance of those rays which are most tonic in character and most bactericidal in their nature. These rays we have been able to show penetrate deeply into the lung tissues and even through the adult thorax.

While this light may not be sufficiently strong to kill bacteria,



it is very inimical to their interests; and the energy absorbed into the blood from this rich actinic light becomes a dynamic asset of the patient, which goes far toward turning the tide in his behalf.

For precisely the same reasons, sunlight, used in the manner described, is the most useful therapeutic agent at our command in combating the pretuberculous stage, the anaemias, the various stages of debility and of convalescence.

Our experience with sunlight now runs into thousands of cases and our results have been such that we find ourselves relying more and more upon this valuable but most unappreciated agent of therapy.

This experience leads us to believe that in many cases the use of sunlight has been the additional factor which has won the fight for these patients.

In surgical forms of tuberculosis these forms of light are invaluable. Especially is this true after surgical procedures have been resorted to and in which healing fails to take place. In cervical adenitis, bone and joint tuberculosis, tuberculous ulcers, lupus and kindred tuberculous lesions, we consider light the agent of first importance and rely almost wholly upon it for their relief.

# MEDICAL AND SURGICAL PROGRESS.

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## EYE INJURIES IN WARFARE.

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### A REVIEW OF RECENT LITERATURE.

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By JOHN GREEN, JR., M. D., of the Editorial Staff.

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1. Adams (*Trans. Ophthal. Soc. United Kingdom*, 1915, Vol. XXXV, pp. 1-68).
2. Cosmettatos (*Ann. d'Oculist.*, August, 1914).
3. Evans (*Midland Medical Journal*, June, 1915).
4. Jessop (*Trans. Ophthal. Soc. United Kingdom*, April 22nd, 1915).
5. Jousset (*Medical Press and Circular*, April 21st, 1915).
6. de Lapersonne (*Archives d'Ophthalmologie*, January-February, 1915).
7. Lister (*Trans. Ophthal. Soc. United Kingdom*, April 22nd, 1915).
8. Mackenzie-Davidson (*Ophthalmoscope*, September, 1915).
9. Milner (*Lancet*, July 24th, 1915).
10. Moore (*Lancet*, August 21st, 1915).
11. Morax (*Ann. d'Oculist.*, November, 1914).
12. Ormond (*Ophthalmic Review*, August, 1915).
13. Pooley (*Trans. Ophthal. Soc. United Kingdom*, April 22nd, 1915).
14. Roll (*Trans. Royal Soc. Med.*, April, 1915).
15. Valude (*Ann. d'Oculist.*, November, 1914).

When the surgical history of the great European war comes to be written, one outstanding feature will undoubtedly be the great preponderance of injuries of the head and head structures. This is obviously due to the almost universal adoption of trench warfare, in which the upper part of the body is most exposed to projectiles of all sorts. Injuries to the eyes and adnexa, and impairment of vision or complete blindness due to wounds of the cortical visual area have been correspondingly frequent. The present review is concerned largely with English and French contributions to the injuries of eyes in warfare.

Ormond has found that exceedingly minute fragments of metal, gun-powder, sand, etc., may be driven into the eyeball by shell explosions. Often the tiny wounds heal rapidly and the incident is soon forgotten. Two cases are related of soldiers invalided home with the diagnosis 'iritis.' Both showed intraocular foreign bodies

to the *x*-ray, and the eyes were removed to insure against sympathetic inflammation.

Lister is of the opinion that very little can be done for eyes containing foreign bodies because many of them fail to give visible shadows with the *x*-ray, practically none are of a magnetic nature, often more foreign bodies are present than have been diagnosed, and even when they can be reached they often break in the grasp of the forceps. He believes that an eye containing a foreign body does not endanger its fellow unless there is entanglement of uvea or lens capsule. He prefers to defer enucleation "until the eye does not see." De Lapersonne notes that foreign bodies in the eye resulting from military injury more frequently give rise to supuration, severe iridocyclitis, etc. than do such injuries in civil life.

Mackenzie-Davidson has devised an ingenious telephonic device to detect the presence of non-magnetizable particles in the eye and orbit. The action of the telephone depends upon variable currents passing through the coil of wire which is wound around one pole of a permanent magnet. These currents cause variations in the magnetic strength and lead to the attraction and release of a small thin iron disc placed in front of the magnet, the vibration of the disc resulting in the emission of sound waves.

The best results were obtained by using an indifferent electrode (carbon depolarized by washing in iodine solution) fixed in position on the skin. To this one end of the telephone wire is attached; the other is attached to the surgical instrument (a needle, probe, forceps, scissors, knife). The moment the exploring instrument touches the fragment, a microphonic rattle is heard. Several cases are related of the successful use of this device in locating foreign bodies within the orbit.

De Lapersonne and Ormond have noted the extreme destructiveness of transverse bullet wounds of the orbit. Seven out of 15 such cases resulted in bilateral blindness (de Lapersonne). On the other hand, it is possible for a bullet to traverse the orbit and do a minimal amount of damage. In cases related by Roll and Adams, bullet wounds of the orbit produced only indirect injury to the eye with the formation of the so-called 'hole' at the macula with central scotoma but with preservation of a good field.

It is generally agreed that sympathetic disease is extremely rare. Jessop and Evans having encountered no cases. Ormond relates one case only which rapidly cleared up on removal of the offending eye. De Lapersonne is agreed that grave sympathetic is rare but describes an insidious form which comes on very gradually, leading to grave consequences.

Certain 'commotion' effects have been noted after trifling injuries to the cornea or conjunctiva, *e. g.*, severe iridocyclitis.

In Jessop's experience very slight swelling of the disc and retina adjacent is apt to follow depressed skull fracture due to bullets or shrapnel. Retinal hemorrhages are generally absent. Visual and color fields are normal. Five or six days after decompression most of the papilloedema has disappeared and it is entirely gone in fourteen to twenty-one days. Choked disc is probably present in all cases of injury to the vault of the skull provided increased intracranial pressure is present.

Lister found that in 50 per cent. of bullet wounds of the head, even grazing wounds of the skull, there was papilloedema. He



does not feel that the mere presence of papilloedema is in itself sufficient warranty for operation. He urges frequent ophthalmoscopic examinations.

Milner relates the cases of two soldiers, both of whom received bullet wounds in the occipital region, resulting in temporary complete blindness (double hemianopsia). Recovery of vision took place with the exception of the left lower quadrant of the field. Symptoms are ascribed to damage of the lower part of the cuneus or the mesial surface of the right occipital lobe. He offers two possible explanations for the double hemianopsia: (1) hemorrhage along the mesial aspect of the occipital lobes, and (2) profound but transitory shock which makes itself felt in both occipital lobes, and temporarily paralyzes the function of the visuo-sensory apparatus. Moore describes a case in which a bullet passed through both occipital lobes, causing immediate blindness. On the fifteenth day vision was restored to reading print with limitation of the right field. Pulse at first 44, raised to 84. The temporary blindness was thought to be due mainly to concussion.

Lister notes that in injury to one occipital cortex there is either hemianopsia or homonymous quadrant anopsia of the opposite side. When there is injury to both occipital lobes there is at first complete blindness often clearing up so that eventually there may be central scotoma with full peripheral field.

Temporary blindness and permanent symmetrical changes in the visual field are explained on von Monakow's last theory of diaschisis: "The injury produces diaschisis or shock on the systems and groups of neurons anatomically and functionally correlated with the cortical neurons damaged or destroyed. In these occipital cases the 'initial' phase of the diaschisis is blindness due to the fact that the shock of the injury to the occipital area of the brain on the side of the lesion is transmitted by commissural fibres to the correlated occipital area on the other side. As, in these cases each area presides over half the field of vision in each eye, the effect of shock on the areas on both sides is blindness. After a time, depending on the condition of the brain, the shock tends to pass off, and the regressive 'phase' is entered on. The correlated centre on the opposite side of the brain to the lesion recovers generally completely, and we are left with the 'residual' phase."

Very few cases of detachment of the retina following military injury have been noted; the incidence seems to be much less than in civil life.

Ormond has noted the return of miner's nystagmus under the exigencies of service. He feels that all individuals with nystagmus should be excluded from the ranks as they are unable to shoot straight and may menace their own men in flanking operations.

Cosmettatos gives an interesting account of the ophthalmic injuries seen at the base hospitals at Previsa and Salonika during the Greco-Turkish and Greco-Bulgarian wars. 118 of the 13,635 treated in this hospital suffered from ocular injuries. 43 were caused by bullets from rifles and machine guns, 4 by shrapnel bullets, 68 by fragments of shells or pieces of wood or stone thrown up by shells, 3 by dynamite explosions. There were 29 cases of complete destruction of the eye, 17 of total loss of vision, 22 of partial permanent blindness and 13 of partial temporary loss of vision. In 42 cases the wound involved one-structure of the eye; in 76

two or more structures. Of the 29 cases of total destruction, 12 were accompanied by fracture of the orbit.

An interesting discussion took place between Valude and Morax on the management of traumatic cataracts in soldiers. Valude insists that the patient should be discharged from the service or at least transferred to the auxiliary forces and that operation should be deferred until the danger of postoperative iritis is reduced to a minimum (excepting cases complicated by secondary glaucoma or the presence of a foreign body). He avers further that no matter how successful the operation may be that it does not make the patient fit to return to the firing line. Morax, on the contrary, states that he knows of individuals who after removal of cataract from the left eye have returned to the firing line. After operation the visual field for orientation is restored. An eye with a cataract diffusing light is more disturbing to the sight than an aphakic eye without a correcting lens. A number of officers have remained in service after losing the sight of one eye. He believes that the risk of operation is not reduced by undue postponement. His own practice is to operate whenever such interference is not definitely contraindicated.

In regard to treatment, de Lapersonne advises complete rest in bed, the administration of antitetanic serum in all cases, flushing the eyes with physiological salt solution, the use of peroxide of hydrogen, potassium permanganate and iodoform as antiseptics. He believes that better results are obtained from not suturing lacerated lids. He is a firm believer in the conjunctival flap in corneal wounds.

Jessop thinks that all eye wounds should be regarded as septic and treated antiseptically, but that operations should be conducted aseptically.

Lister describes the action of rifle and of shrapnel bullets on the eye. The eyeball is often ripped open, its contents evacuated, and it is torn into strips like the petals of a flower. In enucleating such an eye, it is well to grasp each petal separately, draw it forward, and then remove the muscle attachments. In orbital cellulitis and panophthalmitis, Lister has devised the following operation. The cornea is removed and the globe is eviscerated. The muscles are then divided and the sclera is cut so as to leave a frill of 5 mm. in diameter around the uncut optic nerve. The special advantages of this procedure are that there is no danger of meningitis, no shock, the bleeding is less, there is free drainage for any cellulitis, and healing is more rapid than after simple evisceration.

Pooley describes a somewhat similar procedure. He throws back a cuff of conjunctiva to the insertion of the tendons. He then cuts off the anterior segment of the globe just behind the ciliary body and scrapes out the contents of the globe. In this way he avoids opening Tenon's capsule.

Jessop describes cases of temporary blindness occurring in men near whom a severe explosion had occurred. The eyes were normal in all respects. Psychic shock due to violent emotion or commotio cerebri from mechanical causes, such as 'windage' are given as probable causes. Similar cases are described by Ormond.

Under the term 'shell shock' Lister describes various ocular phenomena, such as color sensations, blepharospasm and night blindness. The pupillary reactions remain normal (Pooley). Adams

notes that under the strain of trench life, latent hyperopia becomes manifest, with a consequent decrease in accurate marksmanship. Spasm of accommodation has been observed under similar conditions.

Twenty-eight totally blind men came under Ormond's observation; 21 of these cases were due to bullet wounds which, for the most part, traversed the front part of the head. Four were due to shrapnel. Great disorganization of the globe was noted in cases where the eyeball had not been touched; vitreous was found filled with glistening white masses (old blood clots). Ruptures of the retina and choroid, which were quite common, are explained by Nettleship by assuming that the force of the projectile, in passing through soft tissues, give rise to vibrations which radiate from the axis of the bullet track. These act as 'secondary missiles,' and while unable to cause disintegration of the dense sclerotic, pass through it with sufficient force to rupture the choroid and retina.

Ormond notes that these men, far from being depressed, are unusually cheerful. They are apt to take the view that they are lucky to have escaped with their lives. This frame of mind is due to the policy of keeping these men together, establishing, as it were, a community of interest and sympathy. Industrial training is quickly undertaken, so that before the period of depression arrives, they will be, to some extent, self-supporting and self-dependent.



## COMPLEMENT DEVIATION IN TUBERCULOSIS.

## A REVIEW OF RECENT LITERATURE.

By MOYER S. FLEISHER, M. D., of the Editorial Staff.

1. Much and Leschke (*Beitr. zur Klin. der Tuberkulose*, 1911, Vol. 20, p. 405).
2. Much (*Beitr. zur. Klin. der Tuberkulose*, 1911, Vol. 20, p. 343).
3. Much and Leschke (*Beitr. zur Klin. der Tuberkulose*, 1911, Vol. 20, p. 351).
4. Leschke (*Beitr. zur Klin. der Tuberkulose*, 1911, Vol. 20, p. 393).
5. Much (*Muench. med. Wochenschr.*, 1912, Vol. 59, p. 685).
6. Calmette and Massol (*Compt. rend. Soc. de biol.*, 1912, Vol. 73, p. 120).
7. Calmette and Massol (*Compt. rend. Soc. de biol.*, 1912, Vol. 73, p. 122).
8. Calmette and Massol (*Compt. rend. Soc. de biol.*, 1913, Vol. 74, p. 160).
9. Letulle (*These Fac. Med. Paris*, 1912).
10. Armand, Delille, Rist and Vaucher (*Compt. rend. soc. de Biol.*, 1913, Vol. 74, p. 791).
11. Calmette and Massol (*Annal. d. l'Inst. Past.*, 1914, No. 4, p. 339).
12. Besredka (*Compt. rend. Soc. de biol. Acad. d. Sc.*, 1913, Vol. 156, p. 1633).
13. Besredka and Manoukhine (*Compt. rend. Soc. de biol.*, 1914, Vol. 76, p. 180).
14. Besredka (*Zeitschr. fuer Immunitätsforsch.*, 1914, Vol. 21, p. 77).
15. Debains and Jupille (*Compt. rend. Soc. de biol.*, 1914, Vol. 76, p. 199).
16. Kuss, Leredde and Rubenstein (*Compt. rend. Soc. de biol.*, 1914, Vol. 76, p. 244).
17. Inman (*Ibid.*, p. 251).
18. Bronfenbrenner (*Proc. Soc. Exper. Biol. and Med.*, 1914, Vol. 11, p. 92).
19. Bronfenbrenner (*Arch. Int. Med.*, 1914, Vol. 14, p. 786).
20. Bronfenbrenner (*Zeitschr. fuer Immunitätsforsch.*, 1914, Vol. 23, p. 221).
21. Bronfenbrenner and Rockman (*Bioch. Bull.*, 1914, Vol. 3, p. 381).
22. Stimson (*Bull. No. 101, Hyg. Lab.*, Washington, 1915).

There has practically been a strenuous and persistent attempt, ever since the discovery by Bordet and Gengou of the reaction of complement deviation, to find out some means by which this dis-

covery might serve for the diagnosis of tuberculosis, just as the Wassermann reaction and its modifications have served in the diagnosis of syphilis. Not only was the promise of a test of great clinical value given, but also that the discovery of suitable reagents for such a test might well serve to throw light along the path of our knowledge of immunity to tuberculosis and thence a step along the path of specific therapeutics.

The great difficulty which has been constantly met has been to find a suitable antigen—the substance which shall combine with the specific tuberculous antibodies when these are present and serve as the first link in the chain to which the complement shall be attached, so that it cannot react with the antigen (red blood cells) and the antibody (hemolysin) of the hemolytic system.

In the earlier attempts to utilize the reaction of complement deviation in tuberculosis, the various preparations of tuberculin, as suggested by Koch, were used. It was found that none of these were satisfactory antigens; old tuberculin reacted with only a very small percentage of the known tuberculous sera, and furthermore this antigen also contained anticomplementary substances which would serve to give a false positive reaction. Koch's bacillen emulsion was also used and gave rather better results than had the old tuberculin; in about 50 per cent. of the positive cases a positive reaction was obtained, and when only the more advanced cases were considered the percentage of positive results was even higher than when including cases in both the first and second stages. But since with this reagent it was the early cases—those in which there was most need for some laboratory aid in diagnosis—which failed to react, the value of the bacillen emulsion as an antigen was but slight.

There have been numerous modifications of various antigens, and numerous theories advanced to explain the failure of the various antigens to act; altogether too numerous for us to review. We shall only concern ourselves with the work and antigens of three groups of investigators—namely, Much and his collaborators, Calmette and Massol, and Besredka and those who have used his antigen.

Much believed that neither old tuberculin nor bacillen emulsion contained all the tuberculous antigens, and furthermore that as a result of the handling to which these materials were exposed, the various portions of the extracts are so changed that they will no longer act with the antibodies. Much and his co-workers therefore tried to utilize all portions of the tubercle bacillus in making their antigen, or better, their antigens. They tried various methods of breaking up the bodies of the tubercle bacilli, which in their opinion would least affect the various constituents of the organism, and used each one of these substances into which they divided the organism as a separate antigen. They used first certain lipid substances, such as lecithin and neurin to break up the tubercle bacilli, but later used entirely lactic acid for this purpose. The tubercle bacilli were mixed with a weak solution of lactic acid and allowed to digest in this for several weeks; there remained then in this mixture a large amount of solid material which was separated from the fluid. This solid was then first extracted with alcohol and the fatty acids and lipoids separated; then the residue was extracted with ether to obtain the unsaturated fatty acids and a substance which they considered as being similar to the nastin which Deycke had extracted from the *B. lepræ*. These substances they considered as

'partial antigens'; they therefore had four partial antigens: the lactic acid extract, then the alcohol extract and the ether extract, and finally the protein residue which remained after these two were extracted. The first they considered to be of little value, and only the last three were worked with to any great extent.

All sera were tested against each one of these three antigens, and Much found that some sera from tuberculous individuals reacted with one antigen and some with another, but that few if any reacted with all, or reacted equally strongly with all of these antigens. Very similar results were obtained when serum from tuberculous animals was used.

Much, however, tried to use these partial antigens in immunizing animals, and was able to show that animals treated with these substances would develop a high degree of resistance to infection. He therefore reached the conclusion that the immunity to tuberculosis was due to the development within the body of antibodies against all of these antigens, and that the lack of any one of these partial antibodies would lead to susceptibility or inability to resist an already existent infection. Since it was not always possible to show in the serum antibodies to these partial antigens, Much sought in another manner to demonstrate the existence of these partial antigens, and for this purpose he tried skin reactions with these antigens. He found that in some individuals the skin reaction would give evidence of the existence of one or more of the partial antibodies, but that usually there would be evidence of the absence of certain of the partial antibodies. After treatment with the specific antigen which was lacking, it could be shown that now the skin reaction test would show the presence of these antibodies.

Much drew from the work, outlined here, the conclusion that immunity in tuberculosis is not humoral but cellular: that is the reactions of the invaded host against the infecting organism are cellular reactions and the substances or actions used in combating the infection are confined to the cells and are not thrown out into the blood-stream, as a rule; although, of course, when the antibodies are produced in excessive quantities they may get into the serum and may be shown to exist there by means of the complement deviation reaction. He based this conclusion on the fact that it was possible to show positive skin reactions against various of the partial antigens, while it was not possible to demonstrate antibodies against these same antigens in the serum of the same individual. He furthermore claimed that immunity to tuberculosis was due to the presence of all the partial antibodies, and that it was necessary to produce such partial antibodies in treating tuberculosis; on account of the resistance of the tubercle bacillus to digestion as a result of its fatty covering, it is possible that all of these partial antigens are not set free in the body, and it therefore becomes necessary to supply artificially—by injection—the antigens against which the invaded host has as yet not produced antibodies.

In criticism of Much's work we might say, in the first place, that we can hardly concede that he has been successful in producing antigens which are so little unchanged by the method of extraction or separation that we can rely upon their having the same chemical structure as they have in the living organism. Certainly the long exposure to lactic acid must work some changes, as must also the processes of extraction with alcohol and ether in the Soxhlet ap-



paratus, which is required to extract the fats and lipoids. The protein remaining after these two extractions can hardly be said to be unchanged after such drastic treatment. As regards the theories which Much advances as the result of his work, we are not yet in a position to judge fairly, since there has as yet been little or no confirmation of the results, except by workers immediately associated with Much. The work and the suggestions are, however, interesting, and, if they are confirmed, would certainly open up some interesting lines of investigation. The work does not however aid us in finding a serviceable method for clinical diagnosis.

Calmette and Massol and their co-workers used three different antigens, one containing the dialyzable exobacillary substances, the second containing water-soluble endobacillary substances, and finally, one containing the endobacillary substances which could be extracted by a 10 per cent. peptone solution. With the first of these they found that but few cases showed fixation; with the second, about 40 per cent. of cases gave a fixation reaction; and with the peptone extract nearly 50 per cent. of cases gave fixation. They considered that the antibodies demonstrated by these different antigens were of quite different significance; those reacting with the third antigen were present in the early stages of the disease, and those shown by the second appeared in the later stages; therefore the appearance of the latter antibodies was associated with an aggravation of the condition. They further divided the sera of tuberculous individuals into two classes, dependent upon the presence or absence of inhibitory substances which interfered with the reaction of complement deviation, and they considered that it is the existence of these interfering substances which masks the reaction in a large number of cases. They showed that the addition of inhibiting sera to sera, which did react with the antigens, would prevent the normal action of the latter. In a subsequent publication, Calmette and Massol showed that by dilution, heating to  $56^{\circ}$  C., or the passing through of  $\text{CO}_2$ , it was possible, at least in certain cases, to destroy or remove the inhibiting substances. A number of others have used these antigens in complement deviation work with varying degrees of success. On the whole, the most favorable reports have been made regarding the use of the peptone soluble antigen. Positive results were obtained in from 40 per cent. to slightly over 90 per cent. of cases. It appeared furthermore that by heating the serum to be tested to  $56^{\circ}$  C. for half an hour, in order to inactivate, that a portion of the antibody was often destroyed, as has been observed previously in the case of the luetic antibodies.

The use of Calmette's antigens would seem to offer considerable advantages over those which have been used previously, since the reports have been distinctly favorable, and especially since by the use of the three antigens which have been used by Calmette, it would appear to be possible to form some opinion regarding the progress of the infection. Still the results obtained with these antigens are as yet not sufficiently numerous or sufficiently clear to enable us to draw a definite conclusion.

The antigen used by a third worker has apparently given very good results in the hands of a number of investigators. Besredka devised a new medium for growing the tubercle bacillus, and from the growth of the organisms on this media he has prepared an antigen. The medium is composed of a mixture of bouillon, egg-

white and egg-yolk; in this medium the organisms grow rapidly. The antigen is prepared from the growth in this medium, and in its final form is freed from the bacterial bodies. It would appear that the preparation of the antigen is not simple, but that it requires considerable care and experience, and furthermore it appears that not every sample is of equal value as an antigen. The reports of quite a number of men who have used this antigen would seem to point to this antigen as being the most useful one that we have to-day. In nearly 95 per cent. of tuberculous individuals, a positive reaction was shown, and in only a few cases of normal individuals did the positive reaction appear. Especially interesting is the fact that the reaction is positive in the very largest percentage of the early cases, where, of course, assistance by laboratory methods is of most value. In the later stages of the disease the reaction is less likely to be positive, and therefore the reaction with this antigen may be of some prognostic value.

It was thought that on account of the high content of lipid substances in this antigen that it might give positive reactions with syphilitic sera, and that the positive reactions recorded as indicative of tuberculosis might in fact be due to luetic infection. Bronfenbrenner tested this in several ways. He carried out simultaneous tuberculosis and syphilis deviation tests, and found that, in a large number of cases, the two reactions were positive in one and the same serum. He extracted from the Besredka antigen the lipid substances and found the lipid-free residue still able to give complement deviation with tuberculous sera. Finally, he exhausted from the sera the lipotropic substances, by exposing them to the usual antigens used in the Wassermann reaction, and even after this treatment, the serum of tuberculous individuals was able to react with the Besredka antigen. It is therefore evident that the reaction obtained with this antigen is a specific one for tuberculosis. Bronfenbrenner made the interesting observation mentioned above, that in persons giving the complement deviation reaction for tuberculosis, the Wassermann reaction was frequently positive. This finding suggests naturally that persons with syphilitic infection are more liable to active tuberculous infection, either as a result of the luetic infection or as a result of the treatment directed against this disease.

Stimson has used in his work both Calmette's peptone soluble antigen and the Besredka antigen, as well as several others; his results were most satisfactory with the Besredka antigen, but he was able to confirm in the main the results of both investigators. As a result of his observation of the reactions, and the further course of the patients' condition, he believes that the positive reaction with Calmette's antigen is rather of bad than of favorable import.

Summing up his experience with the various antigens, he divides the tuberculous individuals into six classes in their relation to the complement deviation reaction. (1) Those cases in which no antigen is or has been present in the body and in which we therefore have a negative reaction, since there can be no antibody in the serum. (2) Those cases in which there is antigen present in the body, but for some reason no antibody has been formed, and here also the reaction will be negative. (3) Antigen is present in the body, and antibodies have been formed, but only in sufficient quan-

tity to saturate the antigen existing in the body; the antibody can therefore not be detected by the complement deviation test. (4) Both antigen and antibody are present, and in the case of the latter there is an excess over the former; in such cases the antibody can be demonstrated by the Bordet-Gengou reaction. (5) Antibody and antigen are present, as in the last mentioned case, but in addition there is present an inhibiting substance interfering with the reaction of fixation, and the test is negative. (6) Antigen is no longer being developed, but the antibody evoked by it is still present in the body; the antibody is however gradually decreasing in quantity and this decrease can be demonstrated by successive tests.

These suppositions would account for the frequent confusing disagreement noted between the clinical and the laboratory findings. They can be accepted only as tentative suggestions of the nature of the reaction of the invaded host to tuberculous infection.

It would appear, however, that we have made an advance as regards an antigen to be used in the laboratory diagnosis of tuberculosis. The use of the Besredka antigen certainly holds considerable promise, and the use of the various Calmette antigens may possibly be of value as an aid in prognosis. It will require, however, further confirmatory work definitely to settle the true value of these antigens.



## CORRESPONDENCE.

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CHICAGO, ILL.

Editor, INTERSTATE MEDICAL JOURNAL,

Dear Sir:—Dr. J. Shelton Horsley has very kindly furnished me with a carbon copy of a letter\* which he has written to you for publication in reply to criticisms made by me of the conclusions drawn in his papers on devascularization of intestine. Dr. Horsley has also courteously sent me reprints of his articles together with photographs of a few of the specimens pertaining to them, and has suggested that I might care to reply to his letter through your columns—which, with your permission, I shall be very glad to do.

Dr. Horsley admits that he does not know just how far from the ileocecal junction the segments of bowel which he devascularized were, but feels “reasonably sure that in most cases, if not in all, it was out of the region that could be supplied by this large recurrent artery.” In the only photograph which shows the antimesenteric border of the intestine—namely, that of the specimen from dog No. 10, the vessel in question appears to be very clearly defined along the entire length of the devascularized segment. Of course, one cannot be certain of the interpretation of such a photograph, but the appearances very strongly suggest that which I have offered.

Dr. Horsley believes that the tapes which were tied to each end of the affected segment in five experiments “were tight enough to cut off the circulation in practically every case; so the segment of bowel between the two tapes could not have been nourished by vessels from the adjoining portion of intestine.” With regard to this, I have two suggestions to offer: (1) In an experimental study of occlusion of the pylorus and in studies on experimental intestinal obstruction involving about 75 dogs I noticed the following phenomenon. If a ligature is thrown around the bowel and drawn somewhat snugly, the bowel at the site of the ligature will frequently contract quite markedly; if one waits a few seconds the bowel will relax and the ligature may be tightened several degrees without increasing the pull at its ends. Like an elastic tube, when the bowel dilates it may simultaneously increase in length; when it contracts in circumference it may also decrease in length. One inch of contracted bowel may be equivalent in mass to two or three inches of dilated bowel. When the intestine contracts under a ligature it crowds under that ligature much more tissue than will remain when relaxation occurs; therefore ligatures which seem snug when first tied, later may become fairly loose owing to this rearrangement of the intestinal wall. Therefore, tapes which are applied “sufficiently tight to occlude the bowel” but “not tight enough to injure the intestine” probably will not be tight enough completely and permanently to shut off the circulation. (2) Dr. Horsley did not perform a sufficient number of control experiments. How can one conclude that the nutrition of the devascularized segments was maintained through the omentum unless one knows that such nutrition would not have been maintained had the omentum not been wrapped around the segments in question?

I agree with Dr. Horsley when he says: “It is not a very rare experience to find very large and vascular adhesions of the omentum to a fibroid tumor

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\*Dr. Horsley's letter appeared in the June number.

of the uterus or an ovarian cyst whose pedicle has been twisted. Occasionally such a condition will be seen in which all or most of the blood-supply to a tumor of this type seems to be conveyed through the omentum." I cannot agree with him, however, in the implication that, in my paper, I disregarded the above facts, since I took special pains to avoid just that misunderstanding by citing the operation of omentopexy (Talma-Morris) as an example of a therapeutic procedure based upon those very facts. My statement was as follows: "The value of omentum in walling off inflammatory foci is universally acknowledged, and the abundant vascular channels which may develop in omental adhesions justify the Talma operation; but neither of these conceptions may be applied with safety to the conditions now under discussion. Gangrene is not an inflammatory process; it is characterized by the absence of inflammatory reaction in the tissue directly involved. Such tissues die. The fate of a segment of intestine suddenly deprived of its mesenteric blood-supply depends entirely on the size, number and patency of its intramural collaterals, for the changes following devascularization occur so rapidly that there is no time for vicarious revascularization through fresh adhesions. If a devascularized portion of intestine becomes gangrenous just after it has been wrapped in omentum, the intestinal contents are poured directly into the enclosing omentum and the resultant peritonitis is only a matter of minutes. If the mucosa only is involved, restitution may occur independently of enclosing omentum, though if the defect is large, cicatricial contraction may be marked. The deeper the defect in the intestinal wall the more imminent is perforation, or failing the latter, cicatrix with contraction. Omentum wrapped about devascularized intestine cannot avert gangrene in the slightest, and should gangrene occur, it may prove efficient if the gangrenous area is small in extent, but it cannot be depended upon to confine the intestinal contents and prevent peritonitis." It is not maintained that a minute perforation due to acute necrosis may not be plugged by omentum or any other peritoneal surface which may happen to lie over it, but it is maintained that such necrosis will not be prevented by a subsequent wrapping in omentum when a segment of bowel is suddenly and completely deprived of its blood-supply. Therefore, I restate the following conclusion: "To depend upon omentum to maintain the vitality of devascularized bowel is to invite disaster."

Yours very respectfully,

BENJAMIN F. DAVIS.

June 4th, 1916.

## BOOK REVIEWS.

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**SURGICAL OPERATIONS WITH LOCAL ANESTHESIA.** Second Edition. By Arthur E. Hertzler, A. M., M. D., Ph. D., F. A. C. S., Surgeon to the Halstead Hospital, Kan., the Swedish Hospital, Kansas City, Mo., and to the General Hospital, Kansas City, Mo. New York: Surgery Publishing Company. 1916. Price, \$3.00.

The original edition purposed a purely practical volume unencumbered by historical notes, extensive bibliography, or any discussion of the various theories of the production of local anesthesia. The present edition adheres largely to that plan. The author accedes to the demand for wider scope and includes major operations, thus meeting the general needs of surgeons and increasing thereby the field of usefulness for this second edition. The technique described in various procedures has developed from Hertzler's own wide experience and is essentially that employed by him. While in many instances, not conforming to the method outlined by other authorities, he invariably offers logical reasons for any departure from a generally accepted technique. He emphasizes throughout the need for utmost gentleness, calling attention to the "vast range of difference between the patients bearing the pain and being operated upon painlessly." He very wisely recognizes and comments upon the limitations of the book and expresses a very modest hope that it may "find a sphere of usefulness in the dignified companionship of larger and more pretentious works." The fact that two such comprehensive volumes have appeared during the interval since the publication of the first edition diminishes in no wise the value of the smaller book. Indeed, it rather demonstrates the advantage in certain respects of a work free from the incumbrances and inconveniences of a too great detail. The illustrations by Tom Jones are of the highest order. A more careful editing would have eliminated some very noticeable errors in the text, but these are often all of very minor consequence and cannot seriously detract from the superior essential qualities of the book.

**THE ART OF ANESTHESIA.** By Paluel J. Flagg, M. D., Lecturer in Anesthesia, Fordham University Medical School, Anesthetist to Roosevelt Hospital, Instructor in Anesthesia to Bellevue and Allied Hospitals, Fordham Division, etc. etc. 136 Illustrations. Philadelphia: J. B. Lippincott Company. 1916. Price, \$3.50.

Flagg merits praise for his attempt to present the *art*, to the exclusion of almost all data pertaining to the *science* of anesthesia. Of course, one may legitimately question the exclusion of fundamental data, but if one considers how confusing the admixture of art and science is in all the other volumes that deal with the administration of anesthetics, he almost inevitably comes to the conclusion that Flagg's notion is a most worthy one.

The book is divided into two parts. Part I deals with the classification of anesthesia, characteristic signs, and the administration of the various methods ordinarily employed. In this part of the



volume one finds a clear exposition of every known method of administration, with an intelligent description of technique, dangers, advantages and disadvantages. The reviewer knows of nothing in the literature of anesthesia that is better fitted to the needs of the interne learning to administer anesthetics. There is a slightly exaggerated note of didacticism, and possibly too marked a tendency to introduce the 1, 2, 3, 4 type of descriptions, and yet it is questionable if this criticism has much force if we keep in mind the audience to whom the book is addressed.

Part II deals with the factors incidental to the actual administration of the anesthetic. Under this head there are seven chapters dealing with preliminary medication, postoperative treatment, carbon-dioxide and rebreathing, emergency anesthesia, anesthetists' records, aspirators, and finally an excellent chapter on The Point of View of the Patient, in which some of the subtler points in the psychology of anesthesia are considered.

**A MANUAL OF GYNAECOLOGY AND PELVIC SURGERY.** For Students and Practitioners. By Roland E. Skeel, A. M., M. S., M. D., Associate Clinical Professor of Gynaecology, Medical School of Western Reserve University, etc. etc. With Two Hundred and Eighty-nine Illustrations. Philadelphia: P. Blakiston's Son and Co. 1916. Price, \$3.00.

Any attempt to present all available information in such a large branch of medicine as gynecology within the rather limited space of a small, handy volume is a task of no mean difficulties. Thorough familiarity with the subject, a distinct versatility in terse diction, and keen judgment in the differentiation of the important from the unimportant, are but few of the essential requirements. A careful perusal of this new volume will easily convince the reader that its author seems to measure up well to such requirements. Some clear information can be found almost on any gynecological question, and where the information given in the text would seem insufficient, further enlightenment can readily be obtained by consulting the bibliographic lists appended to each chapter. One versed in modern medical literature cannot fail to appreciate the carefulness and good judgment shown in the selection of these lists.

The impression conveyed by looking through the volume that too much space is given to a description of operative modes of treatment might be due to the fact that most of the illustrations are obviously elucidating operations. If the book, however, really has been written for the benefit of the student and practitioner, the value of a detailed description of an abdominal pan-hysterectomy or of an intestinal resection seems rather doubtful. Such information, if required, should be sought in the many larger volumes available to anybody called upon to do such work.

**SURGERY IN WAR.** By Alfred J. Hull, F. R. C. S., Major, Royal Army Medical Corps, etc. etc. With a Preface by Sir Alfred Keogh, K. C. B., M. D., Hon. Physician to H. M. The King, etc. etc. With 26 Plates and 55 Text Figures. Philadelphia: P. Blakiston's Son and Co. 1916.

The war has been productive along three or four different lines, as far as literature is concerned,—there have been hymns of hate

and other sombre poems, dry analyses of the multicolored 'papers' of the various governments, various so-called histories distinctly embryonic in type, and books devoted to the surgery of warfare. Of all these products, surely the surgical volumes may be accorded first place from the point of view of utilitarianism. The various Oxford War Primers, Delorme's little volume, and now this attractive manual by Hull, set up side by side with the war surgery of LaGarde of the American army and the earlier work by Makins on the South African war, constitute an admirable working library on war surgery.

In the volume by Hull, there are in all fifteen chapters which deal with the bacteriology of wounds in war, the general condition of the wounded, treatments of wounds, a special chapter on the Wright method of the treatment of wounds by saline solutions, the removal of foreign bodies, compound fractures, gangrene, gunshot wounds of the head, joints, spine, and blood-vessels, hemorrhage, gunshot wounds of the abdomen, chest and peripheral nerves.

Anyone who has followed the English and continental weekly medical journals will not find much new material in this volume; on the other hand, he will find the newer opinions on war surgery well condensed, and in particular he will find an excellent restatement of the important work done by Sir Almroth Wright on the subject of wound infections and the treatment of same.

**A LABORATORY COURSE IN SERUM STUDY. Bacteriology 208.** Being a Series of Experiments and Diagnostic Tests in Immunology Carried Out in an Optional Course Given to Medical and Graduate Students in the Department of Bacteriology, College of Physicians and Surgeons, Columbia University, New York, by the Writers. By Hans Zinsser, M. D., J. G. Hopkins, M. D., and Reuben Ottenberg, M. D. New York: The Macmillan Company. 1916.

The essentials which should be included in a laboratory course must, of course, depend upon the time at the disposal of the instructor, and will vary to a certain degree with the personality of the instructor. To criticize the outlines of a laboratory course, such as outlined in this book of Zinsser, Hopkins and Ottenberg, would only be to inject the personality of the critic into the subject; such is scarcely the object of a review. Suffice it to say that the authors have given here the details of a course for a small group of students, which after some years of experiment they have found most suitable. That the field is well covered there is no doubt. The student who will have completed the work as outlined in "Bacteriology 208," will have acquired a very complete working knowledge of immunity, and will be equipped to undertake practically any further work in this field.

The book will be of value not only as a manual for the student, but also as an aid to those who have such courses in charge, since the directions for the necessary preparations for the entire course and for the daily work are given fully in their relation to each day's work.

The merit of the book as a stimulus to those interested in similar courses is questionable.

THE CLINICS OF JOHN B. MURPHY, M. D., AT MERCY HOSPITAL, CHICAGO. Volume V, Number 2, April, 1916. Published Bi-Monthly. Philadelphia: W. B. Saunders Company. 1916. Price per year, \$8.00.

It would be interesting to know whether the last few numbers of the Clinics owe their higher tone to the editorship of Dr. Skillern or to renewed enthusiasm on the part of Dr. Murphy. However this may be, it is certain that the April number merits praise in abundance. The introductory clinic on The Surgery of Tendons and Tendon Sheaths furnishes the reader with the most modern basic work on the anatomy, physiology, pathology and surgery of tendons, and also presents clearly that most difficult of all surgical topics—suppuration of the hand. In this presentation, the work of Mayer on Tendons, and that of Knavel on Infections of the Hand are both accorded full measure of well-deserved authority.

The clinic on Phlegmon of the Spinal Cord, with the usual illuminating remarks by Dr. Mix, and that on Cervical Rib are meaty to the core and merit several readings. One unconsciously ponders on the immense sense of satisfaction that Dr. Murphy must experience when he contemplates his unique capacity to present clinical data in such adequately full and clear fashion.

In addition to the topics already mentioned, the volume deals with: Retention Cyst of Lip, Cervical Rib, Hemorrhagic Dural Cyst, Fracture-Luxation of Spine, Synovitis of Shoulder, Disjunction of Epiphysis of Shoulder, Fractures of Various Bones, and of Various Types, Hemiplegic Contractures, Ankylosis of Knee-Joint, Bowlegs, Talipes Equino Varus, Spastic Cerebral Paralysis, Infantile Paralysis of Leg, Perforating Ulcer of Heel.

TRANSACTIONS OF THE AMERICAN CLIMATOLOGICAL AND CLINICAL ASSOCIATION. For the Year 1915. Volume XXXI. Philadelphia: Printed for the Association. 1915.

This volume of Transactions contains a number of valuable papers on diseases of the respiratory tract. One by Swan on the Personal Equation in Treatment of Tuberculosis is particularly worthy of notice. It again emphasizes the fact that in tuberculosis no hard and fast rules of treatment can be laid down. Every case is a case unto itself. "We need to make a kind of social service diagnosis and to do the kind of work done by social service workers if we would most efficiently help our patients . . .," says Swan in summing up his paper.

There are papers on Heliotherapy in Colorado, on some phases of artificial pneumothorax, and on atmospheric influences in respiratory diseases.

CANDY MEDICATION. By Bernard Fantus, M. D., Professor of Pharmacology and Therapeutics, College of Medicine, University of Illinois, Chicago. St. Louis: C. V. Mosby Company. 1915. Price, \$1.00.

This little book furnishes a description of the method developed by the author for giving medicine to children in the form of candy. It contains a formulary adapted to this style of prescribing, and is intended for the use of pharmacists and for those physicians wishing to avail themselves of the method.



MANUAL OF OPERATIVE SURGERY. By John Fairbairn Binnie, A. M., C. M. (Aberdeen) ; F. A. C. S., Surgeon to the Christian Church, The German and the General Hospitals, Kansas City, Mo., etc. etc. Seventh Edition, Revised and Enlarged. With 1,597 Illustrations, a Number of Which are Printed in Colors. Philadelphia: P. Blakiston's Son and Company. 1916. Price, \$7.50.

One naturally shies at indulging in the time-worn platitude—"this edition, number seven, speaks for itself as regards the value of the book," and yet truly there is strength in numbers. Binnie's work is too well known to call for detailed comment. It is a *vade mecum*, and serves most emphatically and most concretely the purpose that Binnie set for himself in writing it—namely, "to give aid to the surgeon when he is in trouble." It does far more than this, in furnishing a selective and yet admirably judicial and withal personal discussion of the operative procedures associated with practically every type of surgical lesion. One need experience no qualms of conscience in stating that every surgeon should have the book on his shelves.

In spite of numerous additions and new chapters on cardiac surgery, retroperitoneal neoplasms, and war surgery, the book has been preserved well within bounds, and is easily handled by the reader.

MEDICAL LECTURES AND APHORISMS. By Samuel Gee, M. D., F. R. C. P., Honorary Physician to H. R. H. the Prince of Wales, and Consulting Physician to St. Bartholomew's Hospital. With Recollections by J. Wickham Legg. New York: Oxford University Press. 1915. Price, \$2.00.

Dr. Samuel Gee was, in many respects, the English ideal of a physician. He had a sound classical education; a habit of omnivorous reading and an unusually retentive memory made him a man of great erudition. He was an indefatigable worker, a keen clinical observer and the possessor of an eminently sane judgment. On the other hand, he was a man of strong prejudices and distinctly not a scientist in the modern sense of the word. The fact that, though a clinician, he valued anatomy more highly than physiology sufficiently characterizes him. A good teacher rather than an investigator, he nevertheless had a great following and retained the enthusiastic esteem of his pupils throughout his life. The volume under consideration is a collection of clinical lectures and talks delivered at St. Bartholomew's. They are always interesting, never stupid and often most instructive.

PAINLESS CHILDBIRTH, EUTOCIA AND NITROUS OXID-OXYGEN ANALGESIA. By Carl Henry Davis, A. B., M. D., Associate in Obstetrics and Gynecology, Rush Medical College, etc. etc. Chicago: Forbes and Company. 1916. Price, \$1.00.

The author certainly is enthusiastic in his advocacy of nitrous oxide anesthesia for the relief of labor pains. But one cannot help feeling that his cases really are too few in number to justify such enthusiasm. Indeed this feeling is fairly forced on the critical reader by the very fact that Davis uses up about half of the space offered in the little volume for the purpose of demonstrating that the extensive use of twilight sleep by numerous observers in thou-

sands of cases finally has proved its shortcomings and actual dangers.

Will nitrous oxide-oxygen analgesia meet with the same fate after more extensive employment?

The volume, in the opinion of the reviewer, serves well the double purpose of familiarizing the reader both with the technique of gas analgesia and the many objections to twilight sleep.

**POST-MORTEM EXAMINATIONS.** By William S. Wadsworth, M. D., Coroner's Physician of Philadelphia. With 304 Original Illustrations. Philadelphia: W. B. Saunders Company. 1915. Price, \$6.00.

The author lays considerable stress on having a complete equipment, as regards instruments, before making post-mortem examinations; and though there may be those who think that only a small number is necessary, there will no doubt be others who will fully agree with the author. The work under consideration is written with care and has a number of valuable data which will no doubt be of great help to him who is ambitious enough to do a post-mortem in the approved modern way. Books of this sort, while they do not appeal to a large circle of readers, are nevertheless of moment to those who 'specialize' in post-mortems. And even the tyro whom circumstances compel to do a post-mortem will find much of value in Dr. Wadsworth's book.

**THE PRACTICAL MEDICINE SERIES.** Comprising Ten Volumes on the Year's Progress in Medicine and Surgery. Under the General Editorial Charge of Charles L. Mix., A. M., M. D., Professor of Physical Diagnosis in the Northwestern University Medical School. Volume I—General Medicine, Edited by Frank Billings, M. S., M. D., Head of the Medical Department and Dean of the Faculty of Rush Medical College, Chicago. Series 1916. Chicago: The Year Book Publishers.

The first volume of the Practical Medicine Series for 1916 is devoted to internal medicine. Here the busy practitioner may find in condensed form the latest word on the subject of internal diseases. There is much of practical value in the chapters on pellagra and on blood pressure. The 'Allen treatment' of diabetes is comprehensively reviewed with detailed directions as to diet and general management.

**STUDIES IN ETHICS FOR NURSES.** By Charlotte A. Aikens, Formerly Superintendent of Columbia Hospital, Pittsburgh, and of the Iowa Methodist Hospital, Des Moines, etc. etc. Philadelphia: W. B. Saunders Co. 1916. Price, \$1.75.

The training of a nurse includes two distinct parts—distinct, yet inseparable: First, the technical instruction and experience required in the practical care of the sick and the prevention of illness; second, the training in conduct, in ideals of personal living. The question of personal living, the ideals of character and service which a nurse holds will greatly influence her practical work every day of her nursing career.

The purpose of this volume is to emphasize the importance of the ethical training of nurses, and to aid teachers and students in the study of conduct and duty as it relates to nurses and nursing life.

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## EDITORIAL.

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### THE PROBLEM AND ITS SOLUTION.\*

One of the most salient characteristics of Thought, or, rather, of its expression in speech and literature, of the present decade will be found, I think, in its attitude towards problems of Sex and their relative issues. During the past two or three years we have gradually accustomed ourselves to the frank discussion of subjects which, in this country at least, have been hitherto considered suitable for treatment only between the covers of a medical journal, or other similar publication with a strictly limited circulation. To-day, almost to our consternation, we find ourselves not only speaking and writing of topics of the most intimate nature, but discussing them in a manner and a language unknown since the period of the Restoration.

The merits of this trend of thought in our modern social life may, in many respects, be open to question, if not actually deprecated. But in one issue, at least, of the many problems of sex it has come to be recognized by all clear-thinking men and women that fearless and open discussion is not only desirable but absolutely necessary.

The ravages of what is known as 'Venereal Disease,' or 'Sexual Disease,' as I prefer to term it, are at last being brought home to the community in so menacing an aspect that the British Press, as the mouthpiece of the 'man in the street,' has been induced to demand, with no uncertain voice, of those in authority that 'something be done' to check the evil.

At last, after years of patient and earnest endeavor on the part of a handful of men and women, a few definite details and statistics of this most dread scourge have been published for general information. At last has the Press under the authoritative influence of *The Times* and *Morning Post* (to their honour be it said) agreed to forego the 'conspiracy of silence,' to speak of the facts as they

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\*From "The Problem of the Nations." By A. Corbett-Smith. New York: Paul B. Hoeber. 1914.



exist, and, in so doing, to employ terms which shall admit of no secondary interpretation.

Nor is it in the daily press alone that such articles have appeared, for, most remarkable of all perhaps, the *English Review* has recently published an authoritative paper upon "The Doctors and Venereal Disease," and followed it up by other articles bearing closely upon kindred topics.

However greatly we may deplore the abnormal introduction of sex problems into our present-day literature, we cannot but regard it as a praiseworthy policy when the motive is concerned solely with the exposure of certain facts which constitute the gravest danger to the health and well-being of thousands of our fellow-countrymen and women, and with the sincere desire to stamp out the evil. And it is only by the widest propagation of these facts, the nature of the diseases and the remedy therefor, that the evil can be checked and ultimately obliterated. It is not a matter in which the State, at least in this country, can take action, save in a secondary degree only. "*Speaking generally, and of present-day conditions, the prevention and cure of venereal disease among the civil population of this country is a matter which depends primarily, often wholly, on the action of the individual.*"\*

It is a well-worn axiom that in this country the State can be induced to help only those who first help themselves. Practically every movement of genuine importance must rely primarily upon individual effort. Such effort has been evidenced by the agitation on the subject during the past eighteen months, and the State has, upon its side, now given evidence of its serious, if belated, consideration of the problem.

To take one issue only of the problem, as it has been ignored by the State. The number of inmates of lunatic asylums and of other similar institutions, public and private, shows a steady increase each year that passes.\*\*

A very large proportion of these cases is due directly, or indirectly, to sexual disease, and they are more or less incurable.

The wastage of sight, due to ophthalmia neonatorum (a result of gonorrheal infection) involves a loss of over 350,000 pounds per annum to the State.\*\*

Thus we are spending hundreds of thousands, probably millions of pounds annually upon the erection and upkeep of institutions for the admission and treatment of cases for which there is little or no hope of recovery. Our institutional treatment shows itself more and more inadequate in proportion as the number of cases increases. We continue recklessly to spend these large sums in the vain endeavor to cure the results of disease. We spend—do we spend anything at all, apart from the Navy and Army, in attempting to check and exterminate the disease itself?

If such a procedure is regarded as reasonable, it would appear equally reasonable to ignore vaccination, allow smallpox to ravage the land, and involve ourselves in a huge expenditure attempting to cure the vast number of cases which would result.

Naturally so broad a comparison invites criticism, but the basis

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\*"Report to the Local Government Board on Venereal Diseases." By Dr. R. W. Johnstone. 1913. Cd. 7029. Price, 2½d.

\*\*I may direct attention to the article by Dr. Ettie Sayer upon "Mentally Defective Children," in the *Journal of State Medicine*, March, 1914.

is sound. We do not begin at the wrong end in dealing with smallpox, why should we do so with sexual disease, which to-day is as terrible a scourge as ever smallpox was?

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*The solution of the problem lies in the Education of the Individual.* Nothing else will serve. Until adequate measures to this end are universally adopted sexual disease will retain its grip upon the human race.

Professional prostitution, which is quite erroneously presumed to form the basis of the evil, is, as I have shown elsewhere, but a comparatively insignificant factor of propagation. The dissemination of the disease is due in large measure to what may be termed *clandestine* or *amateur* prostitution, to young girls and women who accept lovers either, it may be, for the sake of additional pocket-money or from mere sensuality—sexual impulse, if you will.

This factor will, from the nature of things, never be eliminated so long as civilization exists. The preaching of *abstract* morality is a sheer waste of time and energy. Inculcate principles of *practical* morality, the advantages of continence and such life, by all means; but, first of all, make an honest and unbiased attempt to understand something of human nature, something of the strongest impulse which Nature has bestowed equally upon men and women. Then, having done so, weigh the facts in the balance.

In this complex modern civilization of ours the possibilities of clear thinking upon the part of the individual seem to become ever more and more remote. He is overwhelmed with such a mass of detail, intricate data upon every conceivable subject in the world's affairs, that in attempting a broad conception of the whole he fails to grasp even the significant facts of a single part.

In nothing is this more noticeable than in the subject of sexual disease, save that there is little or no real attempt to visualize either the whole or a definite part. Here we have a mighty international problem which is so vast that it practically escapes notice. It is for all the world like that game which one played at school, the game of trying to find the name of a place on the map. The boy with a little more imagination than the rest would set the name of a country or province which would be printed in capitals right across the page. The ruse seldom failed.

This system of haphazard thought has caused the oddest confusion in methods of approaching the problem. Of course the vast majority of people never think about it at all, unless they chance to be directly affected. Then it is regarded as a by no means unexpected result of a deliberate act which must be concealed from everyone, the medical adviser included. But if ever it is given a thought you will find it muddled up with doctors and medicine and scientific research.

Now most men and women of education who take any count of 'things which matter' have heard of the Ehrlich-Hata Remedy, '606.' At least I have been greatly surprised at the number of people having no interest at all in things medical who have heard of it. But if it is to them anything more than a mere catch-figure (to coin the term) it will probably be vaguely dismissed as some striking scientific discovery which only concerns the medical profession. That it has any immediate connection with the biggest problem of civilization never enters their minds.



For another instance of this indiscriminate kind of thought take the attitude adopted by the more advanced section of the Women's Movement, and as it is indicated by one of their leaders. In a book recently published this lady reiterates again and again her proposals for exterminating sexual disease. These are: (a) Votes for Women; and (b) the absolute chastity of men.

I have been unable to gather what line of action is proposed in the event of the extension of the suffrage; but as regards the second proposal one can only reply that the authoress has not studied her own sex sufficiently, nor the real meaning of sexual impulse. It is once again the old futile attempt to make a community good by Act of Parliament. Women can and must give invaluable help in exterminating the disease; but they do not need the suffrage to assist them, nor will they achieve their object by holding a pistol at the man's head. Let them set their own house in order first, check the rapid spread of amateur prostitution, so far as it is the fault of the women, by educating their sex in an intelligent and rational manner. This will not be effected by hysteria and fanaticism.

People will persist in thinking of sexual disease and possible remedies, just as they think of the measles or scarlet fever; probably as more trivial than these. If necessary, which would seem to be seldom, it is a matter for medical advice. They will not realize that sexual disease as a factor of suffering stands absolutely alone. It is a thing quite apart from the well-known ailments and disorders of life because it has its origin, in the majority of cases, in a deliberate act of the *individual*; and that act is an integral part of the biggest factor in human affairs, Sex.

"The merest platitude!" it will be exclaimed. Possibly it is, but it is one which has been persistently ignored in the consideration of preventive measures. Or if it has not been wholly ignored no more than the vaguest proposals on the subject have been forthcoming.

By the State regulation of prostitution certain Governments evinced their recognition of the driving impulse of sex. It was a genuine attempt to localize and so to check the disease. But the measure has failed. I do not know of a single country where it can be said with truth to have succeeded. Take Japan, for instance, where prostitution is controlled like a Government department, and where the strictest measures are in force. In Professor Hata's own words to me, "In spite of all the attempts which the Government has made to prevent the disease, there is little influence upon the number of cases of young men and prostitutes, or upon the statistics."

That method has failed, or rather it has not wholly succeeded, because it did not strike deep enough. From whatever point of view the problem is regarded, you must ultimately come down to the individual factor.



# ORIGINAL ARTICLES.

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## PART I—SYPHILIS.

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### SYPHILIS AND TRAUMA.

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In the vast amount of present-day literature on syphilis, there is comparatively little written on this extremely important subject. At most, a few words are given in the surgical textbooks touching on such questions as the possible relation of syphilis to the condition of wounds and the non-union of fractures. A careful perusal of many recent volumes of the "Index Medicus" shows how small has been the contribution to this subject, despite the enormous number of articles on syphilis. For any important work on the subject, we must go back a number of years, and the more important articles will be found in the French and German literature. I have been unable to find any articles of note on the subject in American publications.

In a paper of the present scope, it is impossible to do more than touch on some of the important points connected with the subject, but if the relation between syphilis and trauma in certain cases has been made more clear, and the importance of a search for syphilis in obscure cases, with a recent traumatic history, has been emphasized, the article will have accomplished its purpose.

Much of the present-day importance of the subject is due to a definite knowledge of the really vast numbers of unrecognized syphilitics in the community, and the question of trauma lighting up an obscure or latent syphilitic process. The relation of some of these cases to the industrial accident laws of the different states is most important, and the knowledge concerning this important question is as yet extremely meagre.

Certain considerations are to be discussed, and generalizations drawn from data, before we can make deductions from illustrative cases.

First, as to the number of syphilitics in a given community. This is an extremely important point in relation to our subject, as pertaining to the general possibilities and eventualities in accident cases. The word *trauma* will, in the following pages, be used in its broadest

sense to include surgical trauma as well as accidental. Our present increased knowledge in the diagnosis of syphilis from the Wassermann reaction, and equally important radiographs of the skeletal system, make the detection of cases of latent syphilis which years ago would have been unrecognized, a comparatively simple procedure. At the same time, we must remember the triumphs of clinical diagnosis by the older syphilographers concerning the very questions in mind, which we are now treating of, without the modern diagnostic aids.

The most comprehensive and complete article of recent time on this subject is that of Stolper,<sup>1</sup> who has given it careful and impartial consideration in all its phases. Reference to this work will be frequently made in the following pages. The question in former years has also been studied to a considerable extent in France. Gellé,<sup>2</sup> Verneuil,<sup>3</sup> and Choussit, among others, wrote on this subject. As regards the question of specific ulceration of wounds, it is interesting to note the dictum of the latter, who summed up the case succinctly thus: "Wounds may take on the characteristics of specific ulceration, but not necessarily so."

The modern view of spirochætal invasion of the body tissues and the present knowledge of the histology of specific lesions makes much plain in regard to this subject that was obscure to the older authors. In the broadest conception of the subject of syphilis and trauma, we must consider the reaction of the internal organs affected by syphilis as well as the reaction of the soft parts, the bones, muscles, and joint structures.

A wide diversity of opinion seems to exist in connection with the possibilities of previous syphilis in regard to the healing of fractures, and this important subject will be spoken of somewhat in detail. We will, then, take up the subject of the relation of trauma to the joint surfaces and bursæ, and finally consider the relationship of trauma to internal organs affected with syphilis.

In connection with the whole subject, it is well to bear in mind that an estimate that probably 18 to 20 per cent. of the dispensary and acute hospital cases in large communities have syphilis is not far from the truth, and these cases are the ones most subject to trauma. This statement is made after a long general study of the subject, particularly based on the recognition of obscure syphilis, hitherto unrecognized, by means of radiographs of the skeleton.

#### THE EFFECT OF ANTECEDENT SYPHILIS ON THE UNION OF FRACTURES.

Undoubtedly a few patients with fractures acquire syphilis soon after the partial healing of such a fracture, and there is an undoubted relation in some instances between the two that will be

shown later. But the great majority of cases are those where an antecedent syphilis may have an effect on a subsequent fracture.

The effect of a previous syphilis on the reparative processes of bone after fracture and delayed or fibrous union, on account of such an antecedent infection, is a subject to which little attention has been paid. In a general way, it has been supposed by some surgeons that such a previous infection as syphilis may in some way interfere with the healing of bone in the normal time and in the normal way.

Naturally, pathologic material for the study of the subject must be rather limited from the nature of the case. At present there is a great diversity of opinion by some whose work entitles them to an opinion which is of value. Thus, one surgeon, an authority on fractures, in a personal conversation on the subject, expressed the opinion that a previous syphilis *per se* had absolutely no effect on the non-union or delayed union of a subsequent fracture. Another well-known authority on fractures says, "We are told that syphilis plays a part in non-union; perhaps so, but I have not seen it, and have seen many fractures in syphilitics." Another well-known surgeon, a worker in the field of fractures, says (in a recent letter to the writer), "For a period of more than one year we made a Wassermann reaction on every ununited fracture, and we did not fail to get a positive result in a single case. There were too many cases for this to be a coincidence. We are convinced that syphilis has a distinct bearing on non-union." This last citation is certainly suggestive and shows the absolute importance of making a Wassermann test in every case of non-union or delayed unions in fractures. That this is not done as often as it should be, there can be no question.

Why should syphilis have any such action as has been presupposed in the above last remarks on the healing of fractures? Such supposition has been questioned by those whose opinion is entitled to respect. There is little in proof of such contention in any text-book, modern or old, a general statement being mostly given and the reader satisfied with this, or not, as may be. The following represents a theory as to this subject, gleaned from observation of syphilis and the possibilities when fractures occur in these individuals.

To begin with, we must admit the modern idea of the gradual permeation of the body with spirochætes, and the gradual spreading from the initial lesion through the body more or less generally. We must bear in mind that these same spirochætes may remain dormant or latent for years in certain parts of the body. There seems to be some good evidence that the bones in syphilitics may, in certain cases, be more brittle than normal, and that these bones may not be the seat of changes demonstrable by radiography. Gross



changes in bone from syphilis demonstrated by the *x*-ray are very common. These changes may give absolutely no symptoms clinically. Such bones may be the seat of fracture, and in such instances may show slower reparative process than normal bone. This has been proved clinically at least, to my own satisfaction. Now, who is to say that any special bone of a syphilitic is entirely free from change when we find so many bones more or less involved with absolutely no symptoms? As Nichols<sup>4</sup> has well said, "If there were no other way of making a diagnosis of syphilis, it is probable that an *x*-ray of the entire skeleton of the suspected individual would give a positive diagnosis in a large proportion of cases." In other words, given a previous syphilis and a subsequent fracture, it is more than likely that some of this patient's bones will show signs of the previous syphilis.

Now let us imagine a bone in a syphilitic broken, which is not the seat of demonstrable macroscopic changes, either by radiograph or other examination. Who can say that such a bone in its reparative process will be the same as normal bone in all instances? We cannot positively say that it is free from syphilis, even though there are no gross changes.

Reasoning from the above statements, and our knowledge of the great numbers of unrecognized syphilitics, is it not a possibility, even a probability, that many cases of delayed union and non-union of fractures have been supposed to be due to unexplained causes, especially by those surgeons who hold the views as quoted in the first part of the article, where really the cause is a silent syphilis? It is natural that such should be the case, as an exhaustive clinical history with syphilis in mind and a searching clinical examination, including radiography of other bones, are not usually made at the present time in cases of delayed or fibrous union of fractures.

*Former Discussion of Brittleness of Bones in Syphilis.*—Charpy<sup>5</sup> says, concerning the question of fractures in syphilitics due to fragile bones, that all that has been written concerning the subject is covered by the simple announcement, *i. e.*, nothing definite as to etiology of the fragility and proneness to fracture is known.

Gangolphe<sup>6</sup> asked the question, whether all fractures in syphilitics were not on account of local specific lesions (undoubtedly fractures from indirect and muscular violence were meant by this), and questioned whether there was not a local osteitis or gummatous process in all these cases. His observation is incontrovertible evidence to Charpy that spontaneous fractures in syphilitics can have two causes completely different to account for them: (1) A local specific lesion, simple osteitis, or gummatous lesion, which, rarifying the bony structure, diminishes its resistance; and (2) a general

lesion involving the whole skeleton, but not to the extent that anything bony appears outwardly changed.

In connection with these statements of Charpy, it is of interest to note that radiographically we see instances of bones the seat of osteo-periostitis, with sharply localized atrophy in certain spots. Charpy made certain experiments in regard to the question of the fragility of bones in syphilitics, which, though made some time ago, are still extremely valuable on account of the rarity of such experimentation.

The first subject was one with tertiary syphilis, with gummata in the femur and humerus, and also visceral syphilis. The fibula of this subject looked perfectly healthy, but was fractured with 100 kilograms of force, where a normal fibula breaks at a pressure of 300 kilograms, at the same year of age. He then compared the breaking point of this specific fibula with one of a subject sixty-one years of age, and found that this broke at 200 kilograms plus. He estimated by this a reduction of 50 per cent. in the solidity of the skeleton.

Shortly after this, Gangolphe gave him the fibula of a young man of twenty years with similar visceral changes and articular gummata. This fibula seemed perfectly healthy without macroscopic periosteal changes. Nothing pathologic was demonstrated in the medulla of the bone, which was opened after the experiment. This was fractured with 175 kilograms pressure. To be sure the osteoclast was working uniformly and normally; fibulæ were taken which broke at 300 kilograms.

In regard to the question of delayed union of fractures in syphilis, the following case may be cited.<sup>7</sup>

A girl of eleven years was seen at the Surgical Clinic of the Boston Dispensary, April, 1912. There was nothing remarkable in the history. Mother and father were living and well. There was no suggestive history of congenital syphilis. The child had a fracture of the right clavicle. After three weeks' careful treatment, there was no bony union. A careful examination of the child was made at this time, and no signs of congenital syphilis were found, but an x-ray of the leg bones was taken, which showed a marked periostitis of the tibiæ. The child was then put on mixed treatment. In a few weeks the clavicle was nearly solid, and in August, after immobilization for practically three months, the child was well. Until specific treatment was begun there was no attempt at bony union. It is of interest to note that the leg bones, which were quite rough and thick in June, had smoothed out entirely. It was stated that the fall which led to the accident was a comparatively slight one, which is often the case, however, in clavicle fractures in healthy children.

The following 2 cases, not recorded in detail, illustrate, respectively, fracture after slight traumatism and painless fracture in a probable tabetic. I am indebted to Dr. J. J. Murphy for the following case.

A man of thirty-five (looking ten years older), with a previous history of fractured ribs, thought he had sprained his left ankle in March, 1916. This diagnosis was made in a hospital in New York. There was a history of slight, direct violence. Examination showed considerable local tenderness over the middle of the left fibula, with some palpable periosteal thickening, but no crepitus. X-ray examination showed a subperiosteal fracture of the upper third of the left fibula, also marked periosteal thickening and enlargement of the entire fibula, and some osteo-periostitis of the tibia. The patient admitted that the leg was painless for several days following the fracture, even after long standing. Definite history of syphilis was obtained. No obvious signs of tabes found. Two Wassermann tests negative. After treatment of the fracture in a hospital, the patient is now walking with a minimum amount of discomfort, still under specific treatment. Unquestionably, this is an example of the effect of slight traumatism on bone, the seat of specific disease.

The other case, which I saw, illustrating the same type, *i. e.*, of practically painless and unrecognized fracture, is that of a young married woman, who, after a fall downstairs, was seen some few weeks after the injury. She sought help on account of swelling of the ankle and some disability on account of this, but practically no pain. Examination showed the dorsum of the foot markedly swollen. The character of the swelling was peculiar, soft, doughy, and diffused,—unlike the ordinary swelling after fracture. A radiograph showed fracture of the base of the 5th metatarsal bone. There was no union. There had been no treatment previous to her visit. Induced crepitus between the fragments was found to give absolutely no pain. The mentality of this patient was distinctly below par. The pupils reacted sluggishly to light, and there were no knee jerks. Unfortunately, the patient was seen only once, and a more complete history was not obtainable. Here we have an instance of a painless fracture in a probable tabetic.

Gellé cites many convincing cases to show that at times at least, syphilis has had a marked effect on the delayed union or non-union of fractures. He thinks there is no doubt that syphilis makes a patient more liable to fractures. He cites the case of an officer who received a fracture of both bones of the right leg. This was treated by a surgeon of repute for nine months without the slightest sign of any union of the fracture. At this time, careful questioning gave a doubtful specific history. One month from the time intensive mercurial treatment had been instituted, the bones were solid.

He reports another case of a man of thirty with an oblique fracture of the tibia. There was a retardation of consolidation for seven months. The man was found then to have symptoms of undoubted tertiary syphilis. Specific treatment was at once instituted, and during the period from August 13th to September 8th the union had become solid, and the patient was discharged.

He cites another case of a young man of twenty-five with secondary syphilis. This young man had a fracture of the tibia, and there was no union after careful treatment for fifty-five days. Specific treatment was instituted and carried out for fourteen days, when there was commencement of consolidation. The specific treatment was stopped at this time, and for fifteen days care-



ful observation showed no more progress towards union. Mercurial treatment was then instituted, and there was complete consolidation in three weeks.

Space forbids more lengthy recital of cases from Gellé's admirable article, but he seems to give incontrovertible evidence that in a certain number of cases, syphilis retards the union of fractures.

Some of his conclusions are as follow: "Acquired syphilis usually, in the tertiary period, constitutes a cause predisposing to fractures, the cause which appears most clearly in spontaneous fracture when syphilis has engendered a general alteration of the bones, as some rare observations have shown, or that it has determined a local lesion which has diminished at this point the resistance of the bone.

"It retards, in a certain number of cases, the consolidation of fractures, and is sometimes the cause of pseudarthrosis, notwithstanding that, in the majority of cases, the fractures are consolidated after appropriate treatment.

"It can cause specific ulceration of the wound in process of cicatrization and of complicated fractures. In some cases, callus is left in the cicatrix after healing, which constitutes a *locus minoris resistentiæ*. Syphilis has a clearly defined rôle in the production and evolution of fractures, and can manifest itself late at the site of an old fracture; also in cases of fracture after too little traumatism or a retardation in the time of union or a pseudarthrosis. We ought to think of syphilis, find it, and treat it, at the same time using the regular methods for bringing the consolidation of fractures about."

As regards the question of fragility of bones in syphilis and their reaction to traumatism, the following 2 cases may be cited. Venot<sup>s</sup> records the following case: A woman of twenty-seven years, with an inveterate, severe syphilis, received a fracture as follows: The box containing the material for dressings was accidentally pressed on her thigh. It was not at all a heavy box, and, just for a brief moment, touched the thigh, when the femur cracked like glass.

Fulda<sup>9</sup> states that up to the time of his case, spontaneous fracture of the clavicle, on account of localized syphilis, was not noted. He records a case of a married woman twenty-eight years of age, who consulted him November 3rd, 1886, for a swelling of the left clavicle, which had lately become the seat of much pain. Fluctuant swelling was found by Fulda at the middle third of the left clavicle. Skin was not involved. The history showed that two children died soon after birth. Three children were supposedly healthy. For five years the patient had had much pain in the left thigh. There was a question of ocular trouble. May, 1885, a swelling in the left side of her neck appeared, which was incised and pus was evacuated. On account of the clinical history, diagnosis of

gumma of the clavicle was made. November 4th, 1886, she made a violent movement of the arm. She felt a crack in the neighborhood of the swelling and could no longer raise her arm. Fulda made a diagnosis of spontaneous fracture of the clavicle. After specific treatment was instituted, the fracture healed and was solid on November 23rd.

Meriel<sup>10</sup> reports the following interesting case, illustrating the service of radiography in the diagnosis of syphilis and trauma. A porter, thirty-two years of age, was seen at the Hotel Dieu in 1899. He had a fracture of the upper end of the humerus, which was brought about after an insignificant fall. Meriel thought the force was altogether too little to produce such a fracture. A suspicious specific history was obtained as follows: At twelve years of age, an osteitis of the right tibia, for which he took iodide of potassium. He was operated on for this and left the hospital in three weeks. His voice was hoarse and he lost his hair. He denied acquired syphilis. He had some pains in his arms at night for two years. He had swelling in the region of the head of the left humerus. He could not use his left arm very well. Abduction and elevation of the shoulder were limited. Iodide of potassium helped his pain, but not his inability to use the arm. Radiographs showed a great rarification about the upper epiphyseal line of the humerus, and there was a juxta-epiphyseal fracture shown, and also an old fracture of the neck which was healed. The latest fracture was probably caused by muscular contraction, with a rarifying specific osteitis of congenital origin. It is of interest that radiographs of an old fracture of the right humerus showed the same condition.

Thomas<sup>11</sup> reports the following case regarding the subject of fractures and syphilis: A soldier of thirty-seven years entered the hospital with a history of having been kicked by a horse on the right leg. He had a fracture of the right tibia, without displacement, at the junction of the middle and lower third. There was a wound also of the soft parts, but not down to the bone. Signs of infection and suppuration were soon noted in this wound, and in a few days fluctuation was made out and the inflammatory process was localized. An abscess was opened, which investigation showed was not connected with the bone. After this, other local suppurations were opened, and viscid, puriform material was discharged. This time the probe came in contact with bare bone, and careful investigation with regard to syphilis was made, and it was found that the man had had a chancre, and gave, on further questioning, a history of undoubted syphilis, mucous patches, ulcers, etc. Iodide of potassium was given, and in two weeks the wounds were wholly healed. The consolidation of the fracture, which up to this time had been little, began to make marked progress, and soon was complete. The patient had had no specific symptoms for years be-

fore the fracture. Here, the traumatism was the cause of the gum-mata appearing where it did at the seat of fracture.

Thomas concludes, after citing Petit, Verneuil and others, that "traumatism can in syphilis, though the disease be latent for some time, provoke specific accidents in the neighborhood of the wounded region."

In regard to the medicolegal aspect of this question of syphilis and fractures, the following case from Stolper's before-mentioned article is of interest. It illustrates the question of what may happen where the traumatism in this case, fracture, precedes the syphilis. While in good health, a man suffered a broken ankle. It healed with no loss of function. He worked uninterruptedly for three years, when he was infected with syphilis. Six years later, he had a spontaneous fracture at the point of the original fracture. Stolper says that it is untenable that there is any relationship of his present trouble to the original fracture. Any trouble from the old fracture could not be considered, as he had worked uninterruptedly for three years after his injury.

*Syphilis of the Bursæ in Relation to Trauma.*—Syphilis of the bursæ in contradistinction to joint syphilis, and its relation to traumatism, has been little studied, but enough is known at the present time to place us on our guard in all cases of chronic joint and bursal troubles. In chronic bursal conditions, where trauma has been the exciting cause, it is always wise to remember that the bursal condition may be a manifestation of a pre-existing syphilis.

Verneuil was the first to call attention to bursal conditions due to syphilis. Churchman's description,<sup>12</sup> which has reference to trauma in these cases, is interesting to call to mind. "The picture is one of an indolent affection of the bursæ. The disease is quite independent of syphilitic arthritis, the bursæ involved being most often those unconnected with the joints. The bursæ involved are those mostly exposed to trauma, but trauma only determines the site which the disease will occupy."

As an example of syphilitic bursitis, induced by trauma, the following case is of interest.<sup>13</sup>

A boy of thirteen years was seen at the Surgical Clinic of the Boston Dispensary, October 28th, 1913. In August, the boy had trouble with the right elbow after a fall. There was swelling of the elbow and disability, which persisted for a time, and then disappeared almost entirely. On October 27th he fell on the same arm while playing. He has had considerable pain and disability in the elbow ever since. Examination showed that the right elbow was swollen, particularly over the olecranon, where there was circumscribed fluid (olecranon bursa). The motions of the elbow were limited and painful. Two small pieces of loose bone were felt through the fluid. Radiograph showed the lower epiphysis of the humerus to be normal. The two small pieces of bone were clearly seen. November 25th, getting on fairly well but fluid still persists. An indolent olecranon bursitis. Shin bones very tender



to pressure. X-ray of the tibia showed a slight but definite periostitis. Wassermann test negative. The bursa was incised and drained under cocaine. Gummy, honey-like material was evacuated with a small amount of pus. The two small, worm-eaten fragments of bone were also removed from the cavity, which did not connect with the elbow joint. No healing of the wound until specific treatment, local and general, was given, when there was suddenly great improvement and the elbow returned to normal in a short time. The case was followed for six months; no return of the fluid in the elbow region; the function of the arm perfect. This is an example of gummatous bursitis or luetic bursopathy of Verneuil, which was brought into activity by traumatism.

*Syphilis in Relation to Wounds and Injuries of the Soft Parts.*—As regards the relation of syphilis to wounds and bruising of the soft parts, the following cases may be cited.

CASE I.—A seemingly healthy chaffeur was seen July 14th, 1913. The accident history was as follows: Last Saturday he fell from a wall and his right leg was jammed between the wall and a boulder. There was immediately great pain and disability and ecchymosis, which has persisted. Examination showed a very well-developed and well-nourished man; nothing remarkable outside of the injured extremity was found. The right leg was very much swollen and a large area of ecchymosis was present over the middle of the outer aspect of the right leg. The tibia was very tender to pressure, and there was indistinct fluctuation (hematoma in the middle of the ecchymosed area). No crepitus was felt, though the middle of the tibia was very tender to pressure. The fibula lower region was not tender. Radiographs showed no fracture of the tibia or fibula; extensive osteo-periostitis of both bones. The swelling, pain, and tenderness in leg still persisted. A careful history with regard to syphilis was now taken, and facts suggestive of latent congenital syphilis were ascertained. Intensive specific treatment of iodide and mercury was then given. Result was immediate diminution of the localized swelling of leg, decrease of pain and rapid cure of the condition. Intermittent specific treatment was instituted after this time, and the patient has remained well and free from trouble. The diagnosis of previous syphilis was made positive by radiography of the leg bones.

CASE II.—A middle-aged, married woman was seen at the Surgical Clinic of the Boston Dispensary in February, 1916. History of her pregnancies was very suspicious. There was a positive Wassermann reaction. A definite diagnosis of syphilis had been made in another department. The patient had been treated with injections of mercury, and had had a number without any trouble at all. At the site of one of the injections in the thigh, a round, punched-out, gummatous ulcer appeared the size of a dime. This ulceration did not yield to ordinary care and cleanliness, but was nearly healed by mercurial ointment when the patient was lost sight of. This is an example of gummatous ulceration, caused by the trauma at the site of injection in the thigh.

CASE III.—An elderly woman was operated on for an epidermoid cancer of the face. On removal of the stitches, in a few days the wound separated, and in three days there was a round, soft ulcer the size of a nickel. Careful examination, on account of patient complaining of her leg, showed a specific ulcer here, and it was found that the patient had been treated for syphilis. Complete physical examination would have thrown light on the case earlier. There was prompt healing of the ulcer with mercurial ointment, and there was no more scar than as if the wound had healed by first intention.<sup>14</sup>

CASE IV.—A small boy was seen with a circular, bluish lesion on the right cheek the size of a quarter, which he had had for eight months. This lesion followed the bite of a dog. No history of specific disease and not the slightest evidence of it on examination was found. Specimen excised, but unfortunately lost. This ulceration was given careful treatment for weeks with no result. Wassermann and Noguchi reactions strongly positive. Lesions nearly healed in a few weeks of vigorous specific treatment.

CASE V.—A middle-aged woman was seen with a sharply punched-out, soft ulceration of the cheek which began after the sting of a bee. This had been diagnosed as simple ulceration, and treated with Scharlach salve. No specific history was obtained. Nothing definite found on examination. Diagnosis of gumma of the cheek was made and confirmed. After a few weeks of treatment by mercurial ointment and internal specific treatment, the ulcer was entirely cured. One year after the operation, she presented herself with a gumma of the nose, which had been unrecognized.

*The Relation of Trauma to Syphilis of the Internal Organs.*—The possible relation between trauma and syphilis of the internal organs is undoubtedly best exemplified in cardiac disease and aortitis. In this connection, the work of Stolper stands out forcibly, particularly when we remember that his conclusions regarding the possible effects of trauma on those with syphilis of the heart and aorta were made at a time before the spirochæta pallida had been discovered and before the Wassermann reaction was in use. Looking back some years before these discoveries, his knowledge and forecast of the large part played in syphilis in these diseases is no less than astonishing.

A recent ruling given by the Industrial Accident Board of Massachusetts, favorable to the employee in a case of injury through strain of a previously weakened heart during the course of her occupation, is extremely important, though this was not a specific case.

When we recognize that at present perhaps 20 per cent. of all cardiac disease is due to syphilis and that coronary disease, often unrecognized, is a type liable to cause sudden death after exertion, we at once see the importance assumed between cardiac syphilis and possible traumatism, indirect, but none the less important to our subject.

Stolper says, in regard to this question of the internal organs and traumatism, bearing in mind particularly the cardiac syphilis, that the determination of the relation between syphilis and trauma in these cases is naturally much harder to arrive at, because the force is more or less indirect, and the effects cannot be observed as accurately as force applied to the surface of the body. As an example of the effect on the heart from muscle strain, he cites the case of a thirty-year-old waitress, who suddenly died before she was confined. The autopsy showed two large gummata in the muscle wall of the

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NOTE.—Cases III, IV, and V appeared in the *Boston Med. and Surg. Jour.*, 1915, Vol. CLXVIII, No. 14, pp. 508-510.

left ventricle. The affected heart received its greatest strain at the end of the period of pregnancy.

He says that, in some way, syphilitic processes of the aorta, involving the coronary arteries, can disturb the balance of the heart to such an extent that a slight trauma (over-exertion in work, or a blow) can produce sudden disastrous results, and even death, by slight displacement of the heart and consequent disturbance of the coronary circulation.

Unquestionably the future will add much to the present meagre knowledge concerning syphilis and trauma of the internal organs, as the importance of the subject is more appreciated, and the possibilities more often recognized.

#### GENERAL CONCLUSIONS.

As regards fractures and syphilis, it seems unquestionable, as proved by the earlier French writers, that syphilis may at times cause brittle bones, and lead to fractures from traumatism which would, in a person free from syphilis, not lead to fracture. These writers also give evidence that syphilis may in certain cases retard the union of fractures, often to a marked degree, and this evidence is substantiated by more modern observation in certain cases.

It is not too much to say that all cases of fracture with long delayed or fibrous union should be searchingly examined for a possible syphilis. Such patients usually present no outward easily recognized symptoms of the disease. This examination should include a Wassermann test (blood), and radiographic study of other bones of the body. The tibia, fibula, radius and ulna, clavicle and bones of the hand should be studied.

In wounds of the soft parts, either surgical or traumatic, ulceration, without frank sepsis, and constitutional symptoms, should arouse our suspicions, even if the character of the ulceration is not frankly specific. Patient study of such cases will be rewarded often by finding the cause—syphilis—treating it, and curing the patient.

In the same way, internal trauma (railroad accidents, falls, and blows, where the symptoms keep up without definite findings for long periods), should be viewed with suspicion. Skeletal manifestations of old syphilis may be found in these cases through radiography and other modern means of diagnosis at our disposal.

There is probably no subject in medicine which calls for a more open mind and unbiased consideration than that of syphilis and trauma. The tendency to reason *post hoc, ergo propter hoc* in a consideration of this subject is very great, and must be resolutely combated for a proper estimation of values. We must, at the same time, remember these last words of Stolper in his classic article: "If we are keen observers we will shorten many cases of long con-



valescence, and avoid many bad results, and for some will produce a cure, for in the words of her greatest master, Virchow, 'shockingly great is the havoc wrought by syphilis.' "

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## THE ATYPICAL PRIMARY LESION IN THE EARLY DIAGNOSIS OF SYPHILIS.

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The now definitely established possibility of the abortive cure of syphilis in cases recognized in the primary stage, before the Wassermann reaction becomes positive, has added new meaning to the study and identification of the primary focus of the disease. The differentiation of chancre, chancroid, epithelioma, herpes progenerialis and pseudo-chancre redux, as formally taught in textbooks, is a product of the clinical period in the study of syphilis. To the uncertainties of the purely clinical criteria, many unrecognized and unsuspected infections bear witness, to say nothing of those allowed by the physician to reach the secondary stage for the purpose of establishing a diagnosis. The development of the newer diagnostic methods, and particularly the use of the dark-field for the identification of the *Spirochæta pallida*, have supplemented our clinical judgment by important aids, to which recourse should be had much more often than is at present the practice. The wider use both of the dark-field and the Wassermann examination is rapidly enlarging our conception of the importance of the atypical lesion as a possible starting-point for syphilis and demonstrating the essentially artificial character of the textbook schemes and tables for differential diagnosis, which while useful for the purposes of clinical drill in observation, are unavoidably arbitrary, and serve often to conceal from the student the real uncertainties and possibilities of error in practice. While by no means inclined to underestimate the value of diagnosis based on close clinical observation, I have become so convinced of the actual harmfulness of this purely clinical method for the average medical student in this particular case, that I have abandoned the practice of sharply differentiating chancre from chancroid before my students, and after demanding of them a painstaking objective description, have attempted to impress them with the fact that while, for practical purposes, typical primary syphilitic lesions are not difficult of diagnosis, a diagnosis of uncomplicated chancroid cannot be made clinically or even microscopically. The only safe procedure is to regard chancroid as potential chancre until a sufficient lapse of time, under proper observation, has established its benign character. In the last analysis, time and observation constitute now as heretofore, the court of last resort.

In the case of the extragenital primary lesion, a sharpening of our critical faculties and an extension of our methods of investigation are even more urgent than in genital lesions. In such a matter, radical views are paradoxically the most conservative, since they provide the patient with the greatest margin of safety. It is apparently a serious defect of the current medical point of view that physicians are not sufficiently alive to the possibility that whether on the genitals, the tonsil, the cheek, chin or lip, the conjunctiva, the nasal mucosa, the cervix uteri, or elsewhere, any lesion which persists, is associated with local adenopathy or is not frankly epitheliomatous is open to the suspicion of being a primary syphilitic lesion. Each of these categories includes in my own experience atypical primary lesions which have been overlooked or misunderstood by physicians until the appearance of secondaries brought the condition to light. A supposedly benign paronychia is a familiar disguise for an initial syphilitic lesion, disregarded recently with costly results by three patients within my immediate recollection. The systematic cultivation of an alert and suspicious frame of mind, which makes 'Lues I' pop automatically into the field of consciousness on every possible and some impossible occasions, would go a long way toward increasing the percentage of abortive cures. In the recognition of extragenital lesions especially, the dark-field examination assumes paramount importance, and should be resorted to at the outset of an examination, and not after a period of delay and expectancy has effectually removed the possibility of abortive cure.

It is, of course, possible, especially where genital lesions are concerned, to carry suspicion to absurd extremes, as in a case which I recall, in which repeated Wassermann tests, several injections of salvarsan, and two lumbar punctures were made in the effort to establish the syphilitic character of what was obviously a case of herpes progenitalis. There can be no excuse for disregarding clinical knowledge and discrimination between genital lesions, based on painstaking observation, in a mad rush for ultra-modern methods. There can be a blind dependence on the merely laboratory, quite as much as on the merely clinical. To indulge in such extremes is to prove conclusively that one cannot see the forest for the trees. But the employment of the available methods for the recognition of the *Spirochæta pallida* itself, and the repeated Wassermann test with observation, can certainly be pushed to an extent that is as yet seldom reached, and with nothing but benefit to the cause of early diagnosis.

The frequency with which one encounters the reply from a patient with obvious syphilis, when questioned about his chancre, that his physician told him it was "only a chancroid" or "a chafe," suggests that *ulcus mixte* is an unfamiliar entity to the average practitioner,



or that he hesitates to assume the burden of investigation and responsibility which the real doubtfulness of the case entails. It is not too much to say that the frequency with which syphilis follows trivial and inconspicuous primary lesions, is sufficient to make it absolutely unjustifiable for a case to be dismissed or local measures begun, without a painstaking search for the *Spirochæta pallida*, and without an emphatic explanation to the patient of the possibility that he has syphilis. The individual physician or dispensary which cavalierly evades this duty in the doubtful case is dangerously irresponsible.

Uncritical examination, and systematic over-emphasis of clinical differential points contribute their share towards failure to recognize atypical onsets of syphilis. To these elements must be added the premature institution of local treatment, the failure to make a proper search for the organism in the lesion and its regional lymph-nodes, and an inadequate Wassermann follow-up on the case. Under each of these heads it may be worth while to review the following points.

The premature institution of local treatment is a mistake only too frequently seen in all grades of practice. It cannot be too often repeated that the earliest recognition of syphilis does not depend at all upon the Wassermann test. This test only becomes positive in from 35 to 50 per cent. of the cases by the second week, and may according to Hoffmann<sup>1</sup> be slightly positive in chancroid. It marks the end rather than the beginning of the best prospect of abortive cure. The finding of the organism is the crucial diagnostic point. An antiseptic ointment, or dusting powder, of which latter calomel or aristol seems to be the favorite, or the use of a bichloride or other antiseptic wash, promptly puts an end to the possibility of finding spirochetes in the surface exudate from the suspicious lesion itself. Cauterization, another popular procedure, is quite as effective in making a diagnosis impossible, and is apt to introduce the additional clinical complication of a false induration in the lesion. The impulse to 'burn it out' has no place in the frame of mind in which a physician should approach a suspicious lesion.

Proper search for the organism includes at the present time two recognized procedures, both of which have been repeatedly described in the literature. The India ink method is within the reach of many who now employ no method at all. The dark-field of course calls for special apparatus, and the examination of a discharge for the organism demands in both cases a certain amount of experience in the identification of the *Spirochæta pallida*. Without repeating the technical details of the methods, certain points may be emphasized. The first essential for efficient examination is an untreated lesion, already sufficiently discussed. The second essential is the securing of serum from the deeper portions

of the lesion, after proper cleansing, rather than merely from the surface. As McIntosh and Fildes<sup>2</sup> point out, this practically eliminates the necessity for differentiating between *Spirochæta refringens* and *Spirochæta pallida*. According to Nichols,<sup>3</sup> the best prospect of finding the spirochetes is during the first three weeks of the primary lesion. Abrasion or curettage of the lesion, with swab or scalpel, and washing with physiological saline solution, is desirable. The lymph expressed from the deeper portion of the lesion, collected in a fine capillary tube, may be kept several hours. I have seen well-formed *Spirochætæ pallida* from sealed capillary tubes, kept twelve hours at room temperature, the conditions being of course anaerobic. The possibility of referring suspected lymph to an expert for an opinion, should be more widely recognized and employed by physicians. Examination of indurated lesions, in the absence of erosion, should in all cases include aspiration of the indurated base, by a fine needle and hypo-syringe. The value of this procedure, emphasized by Hoffmann, has been substantiated abundantly in my own experience.

Examination of the suspected lesion, if negative, should in all possible cases, be followed by examination of the regional lymph-nodes if they are enlarged, again in accordance with Hoffmann's suggestion. Such a method is especially valuable in lesions about the mouth, since it eliminates the differentiation of mouth spirochetes. The method entails very little discomfort for the patient. After disinfection of the skin with tincture of iodine, a sterile 22-gauge, 1¼-inch needle, attached to an all-glass hypo-syringe, may be plunged vertically into a palpable gland, as it is fixed between the thumb and forefinger. When the needle has passed through the capsule, the gland can be felt to move with the needle. Holding the gland in place with the finger and thumb, the needle is moved about with the skin as a pivot, until enough of the substance of the gland is broken up to permit the aspiration of a small amount of lymph which is examined in the usual way.

No dark-field examination is adequate which is not persistent. A five-minute search for organisms contributes very little to a doubtful case. Half an hour or more is not too much to spend upon favorable specimens, and unless the indications for local measures are urgent, examinations should be repeated.

In the event that careful examination of the untreated lesion fails to show the *Spirochæta pallida*, the Wassermann study of the case becomes important. As a means for the early diagnosis of syphilis, it is secondary to the identification of the *Spirochæta pallida*, but as a means for recognizing a later syphilis, which might otherwise escape detection or proceed to secondaries before recognition, it is of great value. A Wassermann test should be taken at the first visit, and if the diagnosis is not made at that

time, ought theoretically at least, to be taken daily or every other day until the lesion is at least six weeks old. This obviously impossible requirement for the average patient must be modified to include a Wassermann test once a week if possible. If not, the age and general appearance of the lesion must be taken into account. In an older lesion, the second test may be taken at a shorter, and in a fresh lesion after a longer interval from the first visit. In all cases it is my practice to insist on a Wassermann test not later than the fourth week after the sore appeared, supposing the search for spirochetes to have been unsuccessful, and on the eighth and twelfth weeks. Such a follow-up has, on several occasions, identified as syphilitic, supposed chancroids whose real nature had not yet been disclosed by the appearance of secondaries, or in which the secondary eruption had been trivial in character.

Induration, present at the time a lesion first comes under observation, has a dubious value, dependent upon accidents of treatment and secondary infection. I have on several occasions, however, had opportunity to observe the value of induration developing in a previously soft lesion, in the course of non-irritating treatment, or upon a healed lesion, without subsequent erosion. The treatment which I have employed in preference to the orthodox cauterization with pure phenol, consists of the use of hot bichloride soakings and wet dressings. This treatment rapidly cleans the base of the ulcer, and results in healing with a minimum destruction of tissue, while avoiding a factitious induration. Under hospital conditions, the patient is given a mason jar of 1:4000 bichloride solution, boiling hot, every hour or every two hours, and told to soak and wash the penis in it for fifteen minutes, as soon as the temperature becomes bearable. Cotton soaked with the solution is used as a wet dressing. As soon as the base of the ulcer is clean, half-saturated boric acid solution is used in place of the bichloride. Under ambulatory conditions, the soakings can be carried out four or five times a day, with good results. Even phagedenic lesions, and large primary sores with phymosis and edema or diffuse balanitis, yield well to this method. Induration, developing in smaller lesions treated by this method, may be properly regarded as highly suspicious, and an aspiration of the indurated plaque attempted.

The classification of an obscure case as one of *syphilis d'emblée*, or syphilis without chancre, not infrequently resolves itself into failure to identify an atypical primary lesion. The frequency of this occurrence with extra-genital primary lesions is, of course, not thus far to be estimated statistically, but may well be large. Against such occurrences, the dark-field examination of seemingly benign but persistent lesions regardless of their clinical features is one of the most valuable of safeguards, and should become a



mental habit with others than syphilographers. Almkvist<sup>4</sup> has recently called attention to the uncertainties of a diagnosis of syphilis without chancre by an examination of 23 cases, of which only 4, all accidental needle-prick inoculations, seemed to stand a searching analysis. The existence of endo-urethral chancre being now well established, search should always be made for such a lesion after a suspicious intercourse, especially if a gonorrhea supervene. Almkvist reports such a case, in which the *Spirochæta pallida* was demonstrated in the urethral discharge after a gonorrhea had subsided, and the site of the primary erosion was apparently demonstrated endoscopically, posterior to the fossa navicularis. Polland<sup>5</sup> reports what may well have been a similar case, which although under close observation, apparently developed no more than a fugitive erythema at the meatus, followed at the usual interval by the appearance of secondaries. I have myself been impressed by the possibility of confusing a pseudo-chancro redux or gummatous recurrence at the site of a chancre, with a primary lesion, by a case seen in the Ann Arbor clinic. In this case, a seemingly typical induration at the meatus was found on searching examination to contain no demonstrable spirochetes. A history of a similar lesion at the same site four years before was elicited. No satellite bubo developed. Cases of this type, as have been pointed out by various authors, are becoming more frequent under modern intensive methods of early treatment, and are to be differentiated from true reinfections. In the recognition of urethral primary foci, palpation is said to be unreliable, but it may be remarked that palpation in the long axis of the penis is certainly superior to transverse palpation or simple compression of the urethra.

Recognizing the ultimate uncertainties in the diagnosis of early syphilis, and the advantages of abortive cure, Continental opinion on the matter of their treatment has assumed a radical trend, which probably will not find immediate support in this country, although it certainly deserves discussion. Neisser<sup>6</sup> first proposed that in persons in whom the risk of transmitting syphilis was serious as in married or engaged individuals, doubtful lesions should be treated as syphilitic, rather than by expectancy pending diagnosis. Mueller<sup>7</sup> extended this idea to chancroids, in general, on the ground that a high percentage of them were in reality mixed infections. At the outbreak of the war an argument had developed, through Hoffmann's protest against the proposed procedure, which he felt to be too haphazard and unscientific for general adoption. Finger and many others, had previously expressed the belief that a chancroid could harbor a focus of syphilitic infection without having its chancroidal characteristics modified to an appreciable degree. It would seem that what we need more urgently than a haphazard resort to abortive treatment in the majority of doubtful cases, at

the present time, is a more systematic and painstaking application of the available means of diagnosis by dark-field and Wassermann reaction. Only in exceptional cases of the type mentioned by Neisser would resort to empirical salvarsan and mercury be advisable. When such means are adopted, the abortive regime should be followed to the letter, and not in the halfway manner which its uncertain indications would encourage.

It should be emphasized that while a positive finding, either of the organism, or serologically, means syphilis, the earlier negative findings do not by any means imply the absence of syphilis. Even the most painstaking search, with every refinement of technique, may fail to identify a syphilitic infection before the onset of secondary symptoms or the development of a positive Wassermann reaction. Admitting such a condition of affairs in no way excuses the omission of essential details in the examination of a case, where they might have been investigated. The early recognition of syphilis is not robbed of any of its importance by its difficulty. The advantages of abortive cure are so great, that only after every effort has been made to determine the presence of infection can the physician fall back conscientiously upon the time element in the establishing of a diagnosis.

As illustrative of certain of the points brought out in the foregoing discussion, the 2 following cases from my own practice are presented.

CASE I presented himself with a large, flat, crusted papule on the dorsum of the shaft of the penis, developing at an uncertain interval after exposure. He had seen a physician who had given him a dusting powder without making a diagnosis. A marked edema and lymphangitis had developed. The lesion was oval, single, and presented a slight parchment-like induration, poorly outlined. The most searching examination on two occasions failed to reveal any spirochetes. Bichloride soakings were begun, and the ulcer became clean within two or three days and healed rapidly, the initial induration disappearing. A Wassermann test at the first visit was negative. A right-sided inguinal bubo was aborted by icebag and rest. About the third week, a week after the lesion had entirely healed, an irregular induration developed beneath the scar, but no erosion appeared. Dark-field examination could not be made at this time. At the end of the fifth week patient reported again, complaining of loss in weight and severe headaches the previous week. The first signs of a papular syphilide were recognized on scalp and trunk. The Wassermann reaction was strongly positive, and treatment was at once instituted, the Wassermann reaction becoming negative three months later.

In this case circumstances beyond my control interfered with the carrying out of the last resorts in diagnostic procedure, but the points at which more complete examination might have been made, *i. e.*, aspiration of the developing induration in the scar, and more frequent Wassermann tests, are apparent. Impressing on the patient the necessity for prolonged observation was in the last analysis, the critical point in the recognition of this syphilis.

CASE II presented himself ten days after exposure with a group of three papules, each about a centimeter from the other, and none of them exceeding 4 mm. in diameter, on the anterior foreskin. Seen with a dermatological confrère, the case was regarded by both of us as one of herpes simplex. None the less, investigation was begun, on account of the suspicious incubation period, although the patient had had herpes before. Nothing was visible elsewhere on the body, on thorough examination. Five separate dark-field examinations of lymph from the three small papules were made on as many successive days, the lesions being thoroughly scraped. The results were frankly negative. The lesions themselves did not enlarge, and continued to show only the barest suggestion of induration, not in excess of what might result from the trauma. A single, small gland in the left groin, not exceeding a small kidney bean in size, was aspirated, without result. The urethra was thoroughly massaged, and although nothing definite was felt, a possible spot of increased resistance in the anterior third was investigated by passing a platinum loop down the urethra an inch and a half, to collect any discharge. Dark-field examination of the fluid thus obtained was negative. After several days of bichloride treatment, following these examinations, the patient was circumcised at his own request. In spite of my conviction that no focus of syphilitic infection could have escaped me, I warned the patient to report one month from the date of his operation for a Wassermann test, two previous tests having been negative. His secondary eruption appeared to the astonishment of all concerned, just before the date set for his third Wassermann test.

In this case no stone had been left unturned to establish a diagnosis from a possible primary focus. None had been identified. The only procedure not employed was the examination of the circumcised foreskin with its contained lesions by a Levaditi method, for spirochetes, as suggested by Hoffmann. In the absence of urethral discharge, the probabilities seem to favor the herpetic lesions as the primary foci, though rigid examination failed to identify them. It would be difficult to find a case which better illustrates the principle that the modern methods of the Wassermann test and dark-field have increased our ability to make an early diagnosis, but they have not released us from the duty of sufficiently prolonged observation of every case, suspicious or not, before pronouncing finally upon it.

#### SUMMARY.

The typical onset of syphilis may be easily recognized by clinical criteria alone.

On the other hand, the atypical primary syphilitic lesion demands for its early recognition, other than purely clinical criteria.

Routine differential tables systematically over-emphasize the clinical aspects.

In genital lesions, it is conservative to regard every post-coital lesion as worthy of sufficiently prolonged observation (until after the possibility of secondary eruption is passed), to establish the absence of syphilis, and every chancroid as a possible *ulcus mixte*.

The investigation of such lesions demands (a) an *untreated*



lesion; (b) repeated dark-field examinations of the secretions; (c) aspiration of the base of the lesion if indurated, and of adjacent glands; (d) repeated Wassermann tests, at least on the fourth week and the second and third months after the appearance of the lesion.

In extra-genital lesions, persistence, adenopathy and failure to demonstrate frank epithelioma microscopically are grounds for suspicion, and should be ingrained into the mind of every physician, to apply under all circumstances. The dark-field is *sine qua non* in the early identification of this type of lesion.

The referring of cases, or of lymph from lesions, anaerobically preserved in sealed capillary tubes, to nearby experts for dark-field search should be resorted to by the physician who is not in position to do the work himself.

The hot bichloride soaking in the local treatment of lesions, as described, is of value in making possible the recognition of suspicious induration developing under a healing chancre.

*Syphilis d'emblée* may be simply a confession of failure to find the chancre. Examination of the urethra in doubtful cases is indicated.

Abortive antisyphilitic treatment for doubtful cases where the risk of transmission of the infection is great, as suggested by Neisser, is worthy of discussion.

Even the most painstaking examination may fail to demonstrate the primary focus, apparently, so that in the last analysis no case should be dismissed with negative findings until a sufficient period of observation and study has eliminated the last possibility of error.

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## A REVIEW OF THE HISTOLOGICAL LESIONS OF SYPHILIS OF THE NERVOUS SYSTEM.

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The multiformity of lesions produced by syphilis in the central nervous system is comparable to that in other parts of the body. Among the major syphilitic lesions of the brain and cord are syphilitic cerebral endarteritis, syphilitic cerebral periarteritis, gummata of the brain or meninges, syphilitic meningitis, general paresis and a variety of degenerative spinal cord diseases, including tabes dorsalis, syphilitic ataxic paraplegia, etc.

Not infrequently if the examination be full enough it will be found that there is a considerable intermixture of the lesions of two or more types. When the microscopic examination is limited to a review of the gross lesions discovered or to a few areas of the brain or levels of the cord, the results are apt to be misleading. The writer has for several years included a microscopic examination of eighteen areas of the brain and cord in all autopsies not reserved for other studies and has encountered in various instances such a combination of two or more types of lesions, probably referable to syphilis. Fischer<sup>1</sup> places the occurrence of miliary gummata in general paresis at 4 per cent., and reports an even higher occurrence of the same lesion in a small but intensively studied series of spinal cords in paresis.

It is apparent then that any attempt at classification of the lesions of syphilis of the nervous system will encounter an obstacle because of this intermixture, and yet the histological pictures, as a whole, seem separable into the following three chief processes: (1) *Productive*, in which the fixed tissue cells proliferate as in the endothelial multiplication in syphilitic endarteritis and the fibroblastic and fibrous increase in gumma; (2) *infiltrative*, in which there is an exudative accumulation of migratory cells derived from the blood stream, as is seen in the perivascular exudate in paresis and in the perivascular form of cerebral arteritis; (3) *destructive*, in which there results either directly or indirectly a degeneration of the essential nerve tissues. Tabes will serve to illustrate the direct or primary destructive form, while the cysts of softening following arterial obliteration in endarteritis may be considered as an example of an indirect destruction.

Let us briefly review the main varieties of luetic lesions of the nervous system with these processes in mind.

Cerebral syphilitic endarteritis is frequently relatively early in onset in the course of a specific infection, though it may occur at any time from a few months to several years after the primary lesion. From the histological standpoint it forms the best example of an uncomplicated productive lesion. It is characterized by a proliferation of the endothelial lining of the cerebral vessels, chiefly those of larger calibre. It is probable that in the earlier stages there is some infiltration here, but the chief effect is that of reproduction, and following the accumulation of endothelial cells there occurs a fibrous organization through the activity of fibroblasts, producing a permanent restriction in the size of the vessel lumen. The muscle fibres undergo degenerative changes and may disappear. The elastic lamina is often split up into a number of thin layers and not infrequently there occurs a new formation of elastic tissue around the new lumen. The outgrowth of endothelial cells from the vessel walls may form bridges of tissue across the vessel or may lead to complete occlusion either by thrombus formation or by actual plugging with the swollen succulent endothelium. In the final stages of the process there results a greater or less deposition of fibrous tissue inside the original elastic lamina, often limited by a new elastic layer and lined with endothelium, but there is strikingly little cellular infiltration by wandering cells, either in the arterial walls themselves or in the perivascular spaces, and there is little or no evidence of degenerative changes in the new formed tissue. There is in this process nothing that in itself in a given section could be considered as pathognomic of syphilis, but the occurrence of proliferative changes in a considerable number of vessels without degenerative changes, especially in a young adult or in early middle life, is from the practical standpoint sufficient for the diagnosis of syphilitic vascular disease. The *Treponema pallidum* is demonstrable only with considerable difficulty in these lesions. The softening and resorption of areas cut off from the blood supply by the obliteration of vessels differs in no way from the same process following thrombosis of other origin.

A second type of cerebral syphilitic arterial disease differs markedly from that just described, and probably is more closely related to the gummatous and paretic lesions, though showing points of fairly sharp differentiation from each. This is the type of periarterial reaction described by Alzheimer<sup>2</sup> in relation to meningeal processes, and it is characterized by a massive infiltration of the perivascular spaces with lymphocytes showing a marked tendency to invasion of the brain tissues surrounding the vessels. The accumulation of infiltrative cells in the nerve tissues is accompanied by extensive destructive changes and by marked glia cell prolifera-



tion and fibre formation. This type of reaction is seen quite constantly in the neighborhood of gummata and may be merely an early stage of gumma formation. There can occur, however, in the brain quite extensive areas of destruction through this process without the marked fibroblast proliferation and fibrosis and without the endothelial leukocytes, giant cells and foci of necrosis which characterize the gumma, and hence it seems advisable to separate this lesion tentatively, at least from the others. It differs from paresis in the relatively few plasma cells appearing in the exudate, the much more massive perivascular lymphocytosis, the tendency of the exudate to extend beyond the perivascular confines and to infiltrate the surrounding tissues and the much more marked destructive phenomena apparent in the adjacent cortex. In one case of the writer's collection such a periarterial infiltration is in evidence in the left temporal gyrus in a brain which in other areas shows the characteristic picture of paresis. As will be seen from this description the predominant process here is an infiltrative one, but with a marked destructive tendency. There is little evidence of productive activity except in the neuroglia, and here it is possible that the factor of degenerated nerve tissue may form at least a part of the stimulus. This point will receive more attention later.

The gumma or syphilitic neoplasm is characterized by a combination of productive and infiltrative processes. Early in the gumma formation the infiltrative phenomena predominated, but in the final picture the rubbery tumor mass, which gives this formation its name, shows a lesser amount of infiltration, while the productive stimulus on the fixed connective-tissue cells gives rise to a firm fibrous mass in the center of which necrosis occurs. The endothelial leucocytes also proliferate rapidly, and frequently lead to giant-cell formation. Reproductive changes are also apparent in the walls of vessels in and near the tumor and obliteration is common. Mallory<sup>3</sup> ascribes the necrosis in gummata to this vascular obliteration and contrasts it to the caseation of tuberculosis, which he considers a result of the close packing of the reactive endothelioid cells. In the trunk organs the gumma may be resorbed in part, leaving a firm fibrous scar. In the brain, absorption seems to be less common and calcification of the necrotic mass is not unusual. At the periphery of a gumma there is usually a fairly marked infiltration around the vessels and in the spaces between the looser strands of the marginal connective-tissue, forming small, close-packed collections of lymphocytes and endothelioid cells with an occasional plasma cell and mast cell. The gumma always arises from connective-tissue, and multiple foci are common. When the gummatus process attacks the meninges it may produce a local nodule or may spread out in a thin sheet over a large area. It

is possible that this variation is due to the seat of attack and that the widespread involvement depends on extension of the process through the arachnoid spaces, while the localized nodule arises beneath the pia or in the dura. This conception agrees with the conditions apparent in many cases of septic meningitis, where the exudate from a blood-borne infection is restricted to the sub-pial spaces, while that from an otitic or nasal source shows as a widespread purulent exudate of the arachnoidea. Similar findings are seen in hemorrhages where blood escaping from vessels in the brain substance remains beneath the pia, but may spread out there practically over the entire brain, while rupture of a vessel of the meninges gives a large subdural hemorrhage. In widespread gummatous meningitis the process is essentially like that of the localized gumma, but with usually multiple foci of necrosis. The destructive effects of the gummata represent both the direct and indirect types. Direct extension of the new growth to the brain structures occurs with destruction of the essential nerve elements and a reactive proliferation of the mesodermal tissues of the blood vessels and neuroglial reaction. This extension *per contiguitatem* occurs both in nodular and membranous meningeal forms. Degenerative changes are apparent both in the brain and cord in areas immediately subjacent to gummatous meningitis without direct involvement, and widespread nerve cell changes, evidenced by lipid degeneration and chromatolysis, are often found in areas remote from the principal involvement. The indirect effects of gummata are those occasioned by pressure of the growing tumor. Not infrequently these pressure effects are observed not only in the immediate environs of the tumor, but in far removed areas as well. In one of the writer's cases a massive gummatous meningitis of the cerebral dome resulted in compression of the basal structures so that definite histological alteration was apparent in the hippocampal gyrus and other remote areas, quite comparable to that seen in large tumors.

Syphilitic meningitis is an accompaniment of the majority of syphilitic nervous lesions. When outspoken it is usually of the gummatous form, but occasionally the infiltrative process predominates and there is little endothelioid accumulation and little fibrosis and necrosis. Even in the infiltrative form, however, there is a strong tendency to hyperplasia of the connective-tissue of the pia and dura, so that this condition is evidently closely related to the gumma. Infiltration and thickening of the meninges occur as a part of the process in tabes, general paresis, around gummata, and over areas of periarteritic involvement.

General paralysis is characterized by the presence of both infiltrative and destructive processes but with little tendency to production. Spielmeyer<sup>4</sup> summarizes the findings as a concurrence

of a diffuse inflammatory process and degenerative processes in the essential nervous tissues accompanied by changes in the ectodermal supportive tissues (glia). The widespread infiltration here is found in the connective-tissue of the perivascular spaces and to some extent in the meninges, and consists of lymphocytes, plasma cells and pigment-laden phagocytes. The plasma cell infiltration forms the criterion for the histological diagnosis of general paralysis, and is especially characteristic in the mantle infiltration around the capillaries of the cortex where the plasma cells collect in a close packed arrangement, giving a mosaic of angular forms of an almost epithelial appearance. Productive changes giving rise to thickening of blood-vessel walls and meninges are apparent, but are not of prominence. New capillaries are however formed in areas of activity and Accucharo<sup>5</sup> was able to demonstrate by means of a tannin-silver stain, a new growth of connective-tissue from the blood-vessels penetrating the brain tissue. Aside from the infiltrative process, which, as has been said, forms the basis for the histological diagnosis of paresis, by far the most striking change is the destructive effect on the essential nervous tissues and the concomitant glial reaction. Noguchi's demonstration of the direct invasion of brain substance by the treponemata has served to explain this destruction. All grades of degeneration both of cells and fibres can be demonstrated: lipoid degeneration, simple chromatolysis, Nissl's severe cell disease, complete disruption of cells, myelin degeneration, etc. In addition to these alterations, however, which show a striking tendency to occur in multiple foci, there is in a fatal case of paresis a widespread lipoid degeneration of nerve cells and often widespread chromatolysis, which bespeak a severe general influence of the disease as well as the focal attack. While these destructive phenomena in parietic brains are prominent and occur in such widespread arrangement in no other disease than paresis (except sleeping sickness), they are yet in no way pathognomonic either of syphilis or paresis, and in the very early cases and even in some areas of the advanced cases, they may be lacking or of very minor grade, while the perivascular infiltration is still striking, and this has led the writer to liken the destruction phase of the paresis process, which, of course, determines the psychosis, to the cavitation stage of tuberculosis. Evidences of brain destruction thus indicate a terminal stage of the disease. A study is now under way in this laboratory to attempt to clear up the relation of the brain involvement and the periarteritis from which apparently the cortical destruction proceeds. Fildes and MacIntosh<sup>6</sup> have classified general paresis as a parenchymatous brain syphilis in contrast to the other forms which they group as interstitial. Parenchymatous degeneration occurs by direct extension in gummata and strikingly in syphilitic periarteritis, while



in paresis the destructive changes in the parenchyma are only a part of the process, the interstitial infiltrative reaction being equally prominent and forming the criterion for diagnosis and quite probably forming the nidus of infection from which the parenchyma is invaded, so that a strict separation cannot be said to exist.

Tabes dorsalis, syphilitic spastic paraplegia and syphilitic ataxic paraplegia are diseases in which the direct destructive effect of the luetic infection seems to predominate. Degeneration of one or more fibre systems with infiltrative and productive lesions of mild grade in the meninges and vessels, and reactive neuroglial replacement of the destroyed fibres, form the picture here.

Active proliferation of the neuroglia is present practically in all the lesions of cerebral syphilis and might, of course, be a productive reaction to the inflammatory agent. Gliosis, however, appears in reaction to degeneration of nervous tissue determined otherwise than by inflammatory processes, *e. g.*, infarction. The plasmatic non-fibre-forming glia cells react to the products of degeneration with phagocytic activity, and the fibre formers proliferate to fill the gap resulting from resorption of the destroyed nerve tissue. In the cerebral cortex the fibrillar replacement is a tangled mesh without much definite arrangement, but in other areas the orderliness of the fibrillæ forming the scar suggest strongly a simple replacement. This is seen to particular advantage in the cord where the glia arranges itself in the vertical position of the replaced nerve sheaths. The work of Ingebrigsten<sup>7</sup> with cultures of peripheral nerves suggests that the proliferation of the cells of the sheath of Schwann, which is a forerunner of regeneration, is determined by the presence of degenerating myelin, and it may be that the neuroglial reaction is a parallel to this process.

Correlation of clinical symptoms with the lesions is complicated first because the attack of the various forms of cerebrospinal lues is often a multiple one, and second, because of the fact that the symptoms arising from a lesion in a given cortical area may be of two quite different types. Hughlings Jackson, in his epilepsy studies, differentiated the destructive from the discharging lesion, *i. e.*, those whose effects were explainable from loss of brain tissue and those due to overstimulation causing pathological discharge of nerve currents. In many instances of syphilitic disease of the nervous system we can differentiate symptoms of defect (the *ausfallerscheinungen* of the Germans) from those of irritation caused by a discharging lesion (*reizerscheinungen*).

In obliterative endarteritis the predominant symptoms are of the destructive type. Not infrequently there is not even loss of consciousness during the onset of a paralysis or an aphasia, and in some cases there are at no period evidences of pathological nerve

discharge, though in others epileptiform convulsions may usher in the attack or may persist through a long period side by side, with the symptoms of destruction. In one case reported by the writer<sup>8</sup> the onset was without loss of consciousness or convulsions, but later epileptiform attacks appeared and over three hundred were observed and recorded during a hospital residence of six years. As a whole, however, the defect symptoms overshadow the irritative in this disease.

In gumma both types occur; paralyses, aphasia, etc., form symptoms of the defect class, of great importance for localization, and generalized convulsions, or Jacksonian attacks are also frequent.

In general paresis, symptoms of both types are usually intermingled. Not infrequently the disease is ushered in with an excitement not unlike the manic phase of manic depressive insanity (the so-called 'manic form of paresis'), which is best explainable on the basis of a discharging lesion. Paresthesias, hallucinations and convulsions may also be considered as examples of irritative discharges. Marinesco<sup>9</sup> has offered an interesting correlation by his report of the practically constant finding of spirochætæ in the corresponding brain areas in paretics dying with an apoplectic attack. Symptoms of defect predominate in the simple dementing type throughout the course of the disease and practically in all cases in the late stages. The advancing dementia, motor enfeeblement and hypoaesthesia are examples of this.

In tabes the symptoms of the destructive lesion are those referable to a lack of incoming sensory stimuli. The cerebellum and cerebral cortex, working without the data of kinesthesia furnished from muscles, joints and tendons, are unable properly to coordinate motor impulses or to appreciate passive motion, while the loss of the reflex path to the anterior horn cells occasions the loss of the knee-jerks, and by interference with the normal continuous flow of kinesthetic stimuli gives rise to hypotonicity. As with symptoms of defect in general, when the destruction is not too widespread or does not involve a structure really essential to a given end-result, a considerable amount of compensation may occur. Thus by means of data of position reaching the brain through the eyes, a tabetic may make progress which would be impossible with the eyes closed or in the dark, and in cases of lumbar tabes without much involvement of the arms, the use of a cane makes possible a partial compensation for the lack of sensory data from below. The symptoms of irritation are often more troublesome to the tabetic, and hence may carry more emphasis in many cases than those of defect. These are the paresthesias, shooting pains and various organic crises.

The generally accepted statement is that cerebral syphilis responds much more readily to treatment than general paresis, and,

while this is undoubtedly true in the great majority of instances, there is a tendency for this dictum to rebound on itself, in that cases which respond are called cases of cerebral syphilis and the others, paresis, without further proof than the therapeutic results, although some forms of cerebral syphilis are undoubtedly very resistant. Treatment can only be expected to check the progress of the disease and to cure the irritative symptoms, and not to influence the symptoms due directly to destructive lesions. Resorption of exudate with relief of pressure or the disappearance of abnormal discharges may, however, permit the return of function in areas from which symptoms simulating those of defect arose. This is well illustrated by the rapid recovery from paralysis shown by paretics after a stroke. Apparently the productive processes are in general more apt to undergo regression with or without treatment than are the infiltrative. The purest example of a productive lesion, endarteritis, tends to self-limitation, and in the late stages there are few evidences of active syphilis; the condition is determined largely by defect symptoms. The gumma also is prone to undergo regression, although complete absorption with cicatrization does not occur in large gummata of the brain with the same facility as in other organs.

It seems not impossible that in the lesions of productive type we have histological evidence of a reaction on the part of the host, indicating a more active defense and hence a greater responsiveness when aided by medicinal treatment, while in paresis, which shows less reactive response, we are dealing with a condition where there is a closer balance between the defensive and offensive factors, *i. e.*, between the reaction of the host and the virulence of the invader. The long period between the infection and the development of the psychosis (six to twenty years), the low experimental infectivity of treponemata from paretics and the resistance to treatment, all suggest this. Theobald Smith<sup>10</sup> reports a modification both of the locus of invasion and type of reactive exudate of tuberculosis in calves that had been partially immunized; and this is in harmony with the aforementioned view.

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## CEREBRAL SYPHILIS.

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## INTRODUCTION.

Our knowledge of the clinical manifestations of syphilitic affection of the nervous system gained a better foundation with the rapid progress of serological, cytological and chemical studies of the cerebrospinal fluid, and anatomico-pathological investigations particularly those emanating from the laboratories of Nissl, Alzheimer and Dunlap. Prior to that time the whole subject of nervous syphilis was in a state of confusion, for no attempt was made to differentiate the clinical types, which is so important for therapeutic indications and prognostication.

Before considering the clinical phenomena of the various groups of cerebral syphilis, it is advisable to describe briefly the changes in the cerebrospinal fluid and blood in such conditions.

In the syphilis of the nervous system, the examination of the cerebrospinal fluid is of *vital interest*, and, indeed, not infrequently, without such an aid a diagnosis is not possible. There are *five important reactions*: (1) Lymphocytic phenomenon; (2) the globulin content; (3) the Goldsol test precipitation; (4) the Wassermann test of the fluid; (5) the Wassermann test of the blood. In a large number of cases, lymphocytosis bears a direct relation to the meningitic involvement,—*in other words, the more intense the process, the greater the lymphocytic count*. And increased globulin content is another worthy feature frequently accompanying the lymphocytosis. The precipitation of the Goldsol test is of pathognomonic significance in cerebral syphilis. The Wassermann test gives a positive reaction both in the blood and fluid. However, in old cases, the Wassermann test may be negative both in the blood and fluid, especially in the latter. Fehling's reagent is reduced in all forms of nervous syphilis except in cases where a mixed infection is present.

The presence of *Spirochæta pallida* in the cerebrospinal fluid is very difficult to demonstrate. However, such investigators as Hoffmann, Dohio, Tanaka, Séazry, Hough and Payard, and Gaucher and Merlé and others were successful in isolating the trypanosoma in the fluid in certain cases in nervous syphilis.

It is difficult to outline the general symptomatology of cerebral syphilis, for as a matter of fact, there are no pathognomonic features to characterize such a neurologic reaction with the exception of the Argyll-Robertson pupil. According to many observers, this phenomenon is indicative of a luetic organic nervous disease. However, there are cases with autopsies where the Argyll-Robertson pupil occurred in non-syphilitic nervous disorders. It may be said that the feeling among many physicians is that this pupillary sign is very significant of cerebral syphilis.

In classifying cerebral syphilis, it is important to bear in mind the underlying anatomico-pathological process. It is true that in many instances a definite nosologic designation is often very difficult to make because of an admixture of several pathologic conditions. In such cases, it is well to be guided by the most active pathological process characterizing the clinical display. For practical purposes and particularly for therapeutic indications, it is deemed advisable to divide cerebral syphilis in following groups:—

- I. Meningitic (a) acute  
(b) chronic
- II. Gummatous
- III. Endarteritic
- IV. Mixed
- V. Degenerative.

#### TYPES OF CEREBRAL SYPHILIS.

I. *Meningitic*.—(a) The acute form of syphilitic meningitis presents certain striking features which are different from the other infectious forms of meningitis. It is afebrile in course unless complicated by some other infecting organism. Rigidity of the neck, Kernig's sign and photophobia rarely manifest. Headaches, vomiting, dullness, drowsiness, and general fatigue form a part of the clinical picture. Furthermore, transitory confusional states of varying duration and intensity are of frequent occurrence. As a rule the luetic infection is relatively of recent origin.

The meningitic involvement is either limited to the base or to the convexity. The process may be diffuse or circumscribed. At the base the meningitic infection may involve one or more cranial nerves, frequently the third and fourth nerves. There are cases where an isolated nerve, such as the facial, is involved. Optic neuritis, choked discs, and atrophy usually secondary may be in evidence. The Argyll-Robertson pupil is not a frequent phenomenon in this form of cerebral syphilis.

The lymphocytic count is high, and the globulin content is increased. The Wassermann test in the blood and fluid is positive. The Goldsol test gives the usual reaction.

The following case will serve as an illustration of the acute form of luetic meningitis.

J. N., sailor, single, *æt.* twenty-six, native of Sweden, three years in the United States. Admitted to the Psychopathic Department of Bellevue Hospital May 14th, 1913. The patient was always well and there was no history of severe diseases except that in February, 1913, that is four months prior to his admission to the hospital, he contracted syphilis.

Five weeks prior to his admission the patient began to suffer with headaches and would see black spots before his eyes. Soon he found difficulty with walking. He felt weak and somewhat drowsy. For this reason he was unable to attend to his work. Upon admission to the hospital he was rather confused, had difficulty to express himself, perseverated and appeared depressed and drowsy. On the next day the aphasia and confusion disappeared and he was able to give a good account of himself. He maintained that he was sick, complained of headaches and felt fatigued and weak.

Physically the patient was of fairly good development. There were evidences of iritis, but the pupils responded to light and accommodation. Some nystagmoid twitchings of both eyeballs were noted. Knee jerks were overactive and unequal. The gait was somewhat waddling but no definite ataxia could be demonstrated. No sensory disturbances were present. The Wassermann test was positive in the blood and fluid and there were two hundred and eighty lymphocytes per cmm. and globulin content was much increased.

In this case the *headache, transitory confusion and aphasia, fatiguability and the high lymphocytosis with positive Wassermann in the blood and fluid stand out prominently in the picture of luetic meningitis of the convexity.*

(b) *The chronic meningitis variety of cerebral syphilis does not run a regular course and indeed there are no pathognomonic features to typify this condition. In the early stages, dysarthria, poor memory, and oddity in conduct do not constitute a part of the clinical picture. Not infrequently the differentiation between this form of cerebral syphilis and general paralysis is extremely difficult to establish. Likewise, in many instances the anatomico-pathological features may simulate that of general paralysis. Dunlap very pertinently says: "In most of these meningeal cases the lymphocyte and plasma-cell exudate behaves as it is expected to do and is limited to the meninges, but sometimes, especially in certain regions (gyrus rectus or temporal lobes) a slight exudate is also seen in the depths of the nervous tissues, sometimes as a plain extension inwards from the meninges, but at times no evidence of such extension can be seen; we thus, in rare cases of cerebral syphilis, have patches in the cortex that look just like general paralysis; especially like general paralysis of long duration, where regularly only a slight exudate is present. So the boundaries of general paralysis, usually sharp, are not always so, and occasionally it is almost impossible to say whether we have under the microscope mild general paralysis or the meningeal form of late cerebral syphilis."*



The laboratory findings (fluid and blood) are practically the same as in general paralysis.

The following will serve as an example of this group of cases.

B. K., female, colored, *æ*t. fifty-two. Admitted to Manhattan State Hospital September 14th, 1906. Patient gave a clear history of syphilis which she contracted when she was thirty-two years old. She always suffered with headaches which were more intense in the years of 1894 and 1895. For three years prior to her admission to the hospital, she was nervous and inclined to be depressed. In January, 1906, she became irritable, fault-finding and depressed. Her memory at times appeared poor. Three days before entering the hospital she denied herself food, was much depressed, expressed morbid ideas, and commitment to the state hospital was imperative.

Upon admission she manifested considerable depression, cried and stated that she was dejected and exhausted. Aside from the depression, feeling of inadequacy and numerous somatic complaints, there were no delusions, and *memory and orientation* were intact. No writing defect, and speech was not impaired.

Physically she showed numerous small scars on body; partial ptosis of the right lid; unequal pupils (left contracted) which did not react to light, but the left one responded to accommodation. Knee jerks were active, and there was no Babinski phenomenon or clonus; fine tremor of eyelids and fingers; some evidences of pulmonary involvement, and second sound was accentuated. Lymphocytosis of the cerebro-spinal fluid and the Wassermann test were not done because at that period this method was non-existent.

For some time her condition showed very little variation; at times she was much depressed, anxious, agitated, and would make many somatic complaints some of which had a delusional coloring. In June, 1907, there was a decided change in her condition, and gradually she became more restless, would continually rub her head with her hands, talked in a whining tone of voice, would become excited and gradually declined both mentally and physically. Death occurred November 2nd, 1909.

The post-mortem examination of this case failed to demonstrate histological changes characteristic for general paralysis. However, "there were a chronic diffuse meningitis, consisting mainly of lymphoid cells and occasional plasma cell in the visceral layer of the pia; this infiltrate was rather more pronounced towards the frontal, prefrontal and basal areas of the brain elsewhere, but nowhere pronounced. There was no essential invasion of the cortex by the infiltrate except occasionally a slight infiltration of the sheaths of the larger vessels near their points of entrance into the cortex. The cortical changes were not remarkable beyond a slight superficial neurologic reaction and diffuse nerve cell changes. Some of the cortical vessels showed a moderate endothelial proliferation beyond the normal, and in the adventitia of many of the vessels, and especially those of the marrow, a pale waxy pigment was seen."\*

This case demonstrates the difficulty one encounters in making a differentiation between cerebral lues and general paralysis. From the neurologic standpoint, the diagnosis of general paralysis cannot be very well excluded, but on the other hand, the mental picture especially in the early stages did not present the characteristic features of general paralysis. As the disease progressed, dementia

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\*For this pathological report the author is indebted to Dr. Ch. Lambert, formerly resident pathologist at Manhattan State Hospital, N. Y.

came to the foreground with erratic conduct, etc., the diagnosis of general paralysis appeared plausible. However, in the incipient stage, cerebral syphilis was considered.

II. *Gummatous*.—Gumma occurs single or multiple, but the latter more frequently, especially in the brain. It may be of an osteitic or periostitic or membranous or cerebral origin. The usual site is at the base of the brain, or in the area of the left Sylvian fissure.

The symptomatic display of cerebral gumma is practically identical with that of cerebral neoplasm, but the Wassermann test in the blood and fluid is positive, the lymphocytic count is relatively high, depending upon meningeal irritation, the globulin content is increased, and the Goldsol test is present.

The following case belongs to this group.

C. M., female, Russian, *æt.* forty-five; habits moderate. Before marriage (was married twenty years) she had sexual relations with a man who died of syphilis.

For more than ten years she was inclined to be drowsy and could not do her work as well as formerly. She drank water to excess for more than ten years. At times she would become excited, restless and suffered with headaches. Three years ago purulent discharge from right nostril appeared.

Two years prior to her admission to the hospital (was admitted to Bellevue Hospital, 1912), she fainted and since then was subject to such spells. A year later convulsions became manifest which were recurrent in nature. It was thought by her husband that the convulsive seizures were limited to the right side. Blindness in the left eye was of more than one year's duration. Later her condition became worse and her conduct grew erratic.

When admitted to the hospital she was restless, confused; was drowsy and showed evidences of incomplete motor aphasia without sensory symptoms.

Physically she was well developed and visceral organs were without disease. From the neurological side she showed left optic atrophy; irregular and unequal pupils; light and accommodation reaction was good in the right but very slight in the left. Right side of the face was slightly flattened out. Tremor of the right hand was intention in character. The tremor of the left hand was only very slight. Some ataxia and adiodokokinesis in the right hand. Knee jerks were exaggerated but there was no Babinski phenomenon or clonus. The right abdominal reflex was diminished, but the left one active. There were 277 lymphocytes per cmm., globulin much increased, and the Wassermann test was positive in the blood and fluid.

In this case we find rather a slow and gradual development in an individual in whom the luetic infection was of long standing. The pressure symptoms were quite marked and the presence of an active meningeal involvement was evidenced by the *high lymphocytic count*. (As a matter of fact a pure gummatous growth without meningeal complication is *extremely rare*.)

III. *Endarteritic*.—The symptoms of endarteritic form of cerebral syphilis are practically the same as in cerebral arterio-sclerosis. The prodromal symptoms are *headaches, dizziness, insomnia, ver-*

*tigenous attacks and general psychic alterations* which manifest in irritability and reduction of intellectual activity. Huebner describes peculiar states of semiconfusion, during which time the patient may commit all kinds of peculiar things for which he shows a certain degree of amnesia. Apoplectiform attacks either of a thrombotic or hemorrhagic origin with motor disturbances, aphasic symptoms and other focal symptoms frequently occur.

In this group of cases the Wassermann test in the blood is usually positive, but the fluid may give negative findings.

The following case shows the development and behaviour of one of the clinical pictures:

J. E., male, *æ*t. sixty, painter by occupation and of moderate habits.

In October, 1910, for about one year and a half prior to his admission to Bellevue Hospital (admitted March 16th, 1912) he was inclined to be irritable, suffered with occasional headaches and vertigo and would have attacks of unconsciousness. Occasionally he would vomit, at times was drowsy and on account of his dizzy spells he was unable to hold positions. December 22nd, 1912, he had a vomiting spell which lasted one hour and one half, and for the ensuing three weeks he frequently vomited and had vertiginous attacks. He also complained of his head and would say, "Oh my head, Oh my head." In the latter part of January, 1912, the left side of the body became paralyzed, and for five days he experienced choking sensations and had difficulty in swallowing. It was claimed that his speech was thick and not distinct. Four weeks before his coming to the hospital he began to talk in a rambling manner and became excited, restless, confused and manifested assaultive tendencies.

Upon admission to the hospital the patient was in a state of excitement and confusion. He shouted and screamed at the top of his voice, indulged in endless fabrications, reacted to hallucinations, at times appeared apprehensive and fearful, and his speech was rambling and incoherent. His memory was much impaired and likewise judgment was defective. He absolutely had no insight into his condition.

Physically he was rather poorly nourished and presented evidences of arteriosclerosis. Blood-pressure was 210. He was blind in both eyes; pupils were irregular in outline and unequal and reacted to light and accommodation slowly. The upper portions of both discs were somewhat blurred, but not sufficient to explain the blindness. The left side of the face was flattened out, and the tongue deviated to the left side. Speech was not affected and the other cranial nerves showed no abnormalities. There were no evidences of paralysis of the upper or lower extremities. The deep reflexes were active except the left knee jerk could not be elicited. There was no Babinski phenomenon or clonus. The right abdominal reflex was absent but the left one could be demonstrated. As soon as he assumed an erect posture he would fall backward. There was a coarse tremor of both hands. No definite sensory disturbances could be satisfactorily demonstrated. Urine contained large amounts of albumen, hyaline and granular casts, and the specific gravity was 1028. The Wassermann test in the blood was positive, but negative in the fluid; there were 20 cells per cmm. and the globulin content was slightly increased.

The patient was transferred to Manhattan State Hospital, Wards Island, N. Y., where his condition grew progressively worse and death occurred April 18th, 1912.



Post-mortem examination revealed "a pulpy non-depressed softening extending from the left occipital tip to the occipito-parietal fissure involving the whole cuneus, the lingual gyrus and most of the fusiform gyrus and together with the adjoining margin of T 3. In the right hemisphere there was a smaller softening involving the same anatomical structures. (On the strength of this pathological condition the blindness could be easily explained.) Another softening was found on the under surface of the left cerebellar hemisphere and the upper surface of the right cerebellar hemisphere. (This pathological condition will account for the clinical cerebellar manifestation.) The large blood-vessels showed atheromatous thickening and the lumen of the posterior cerebral arteries was reduced. Microscopical examination revealed much pigment in the nerve cells of the brain and there were scattered lymphoid cells in the pia mater, especially in that covering the gyrus rectus, but the cortex except for an occasional lymphoid cell, was essentially clear. The microscopid findings of the blood-vessels were *characteristic of syphilitic endarteritis*."<sup>\*</sup>

In this case the clinical manifestations were fairly well defined and the diagnosis of cerebral arteriosclerosis was fully justifiable. The positive Wassermann test in the blood and the mild lymphocytosis in the cerebrospinal fluid substantiated the luetic nature of the endarteritic process.

IV. *Mixed*.—In this form of cerebral syphilis two or more pathological processes of equal intensity may dominate the clinical picture. The following case will serve as illustration.

The patient was an American, *æt.* fifty-five, printer by occupation, of moderate habits and history of syphilis could not be established.

For a few years prior to admission to Bellevue Hospital (was admitted there December 11th, 1913) he suffered with headaches. In January, 1913, he had an attack of unconsciousness. He was then taken to a hospital where he remained a day or so. Although he recovered, yet for six weeks he did not do any work. It was said that he was well until December 10th, 1913, when he had another attack of unconsciousness, following which he became confused and spoke in a rambling manner.

When admitted to Bellevue Hospital he was dull, perplexed and showed well-defined evidences of sensory aphasia with a motor element.

Physically he was poorly nourished and the arteries showed thickening. Pupils were irregular in outline, and the right one did not respond to light, but the left one reacted fairly well. There was a double optic neuritis and a traumatic choroiditis in the right. The other cranial nerves were intact. The knee jerks were overactive and slightly unequal and there was no Babinski phenomenon or clonus. No ataxia or sensory disturbances. The Wassermann test in the blood and fluid was positive, and there was a fairly high lymphocytosis with increased globulin content. Under the antiluetic treatment (including intravenous salvarsan, intraspinal salvarsanized serum and mercury and iodides) the patient made a fairly good improvement, except some residuals of sensory aphasia were manifest.

In this case a dual active process was in evidence. The lymphocytosis with the positive Wassermann test in the fluid, optic neuritis and rapid improvement under treatment would be ex-

<sup>\*</sup>For this pathological report the author is indebted to Dr. Ch. Dunlap of the New York Psychiatric Institute, New York.

plained on the basis of a meningitic condition. Again the apoplectic-form attacks are ascribed to the endarteritic process.

V. *Degenerative*.—This group includes general paralysis (cerebral level) and tabes (spinal level). In general paralysis the Wassermann test is invariably positive both in the blood and fluid. Likewise, there is a lymphocytosis of the cerebrospinal fluid, the intensity of which depends upon the degree of meningeal irritation. The globulin content is increased, and the Goldsol test gives the usual characteristic curve. The *Spirochætæ pallida* were found in many cases of general paralysis. According to Noguchi and Moore they were demonstrated "in all layers of the cortex with the exception of the outer or neuroglia layer." The clinical varieties of general paralysis are too well known to require description.

The *mental symptoms* in cerebral syphilis vary. In some cases the picture may simulate any of the clinical varieties of general paralysis. Again delirious confusional states, particularly in the meningitic form are often encountered. It is interesting to note that mild confusional episodes with fabrications, transitory and recurring in nature, varying from a few hours to several days, occur in the syphilitic meningitis. There are clinical pictures which are characterized by depression, agitation, later developing manic symptoms with expansive ideas. A Korsakoff symptom-complex, acute hallucinatory states and chronic hallucinosis with delusional ideas occur in various forms of cerebral syphilis.

#### PROGNOSIS.

In considering the prognosis of cerebral syphilis, it is necessary to bear in mind the extent of the actual damage to the nervous tissue, the constitutional resistance and the reaction to therapeutic measures. In the acute meningitic form of cerebral syphilis, the prognosis is relatively good, and under active and persistent treatment, recurrence may be obviated. The outlook in chronic meningitis is not very encouraging because the patients do not yield readily to therapeutic measures, and furthermore defect symptoms frequently remain. In cerebral gummata, partial or even complete restoration is possible, depending, however, upon the intensity of the injury sustained by the nervous tissue. In the endarteritic form the prognostic outlook is decidedly poor.

Since the demonstration of the *Spirochæta pallida* in general paralysis, many clinicians became infused with undue optimism regarding its treatment and felt that by exerting a direct germicidal action on the trypanosoma the disease could be actually arrested and even a cure would be possible. However, it should not be forgotten that the pathological condition in general paralysis is decidedly of a grave nature, and that by arresting the ac-

tivity of the *Spirochæta pallida* complete or even partial restoration of the destructive tissue is hardly conceivable. Nevertheless, this should not deter one in applying every possible antiluetic remedy to cases of general paralysis, especially in the early stages.

#### TREATMENT.

It would be impossible to discuss in great detail the therapy of cerebral syphilis, but a few practical points must be emphasized. It is important to bear in mind that in every case of cerebral syphilis one finds a threefold process—namely, local, general, and constitutional. The first expresses itself in the nervous system, in certain local manifestations; the second, in the systemic reaction; and the third is the constitutional background upon which the disease was engrafted. *Briefly stated, the treatment should be directed along the lines of removing the focal symptoms, rid the system of the poison, and strengthen the constitutional resistance.* Another fact of great significance is that in the therapeutic procedure we should be guided by the cerebrospinal fluid examination rather than by the Wassermann test of the blood. By the former method, we are able to get a correct appreciation of the actual process of the central nervous system, whereas the latter will indicate only the condition of the systemic infection.

In all instances, the usual hygienic, dietetic and tonic measures should be taken in consideration with the actual specific treatment which consists of three drugs: (1) Salvarsan and neosalvarsan; (2) mercury, and (3) potassium iodide.

To quote from my former paper: "It is generally contended that salvarsan or neosalvarsan exerts a specific action on the *Spirochæta pallida* and the effect of mercury is on the inflammatory by-product as well as on the syphilitic germ. Potassium iodide aids the breaking up of the connective-tissue and prevents its formation. Recently the work of Jobling and Petersen shows very definitely that iodides are only adjuvants in the treatment of syphilis, and to sum up their views, 'iodine neutralizes the action of the agents which prevent resolution and absorption of diseased or necrotic tissue in syphilis and at the same time lays bare to the action of real germicidal agent the infecting organism which previously had been protected by necrotic tissue. With the exposure of the infecting organism such agents as mercury and salvarsan would be more effective (quoted by an editorial writer in the *Journal American Medical Association*, January 22nd, 1916).'

"In all cases where the usual contraindications are wanting salvarsan and neosalvarsan should be administered. It is always wiser to begin with a small dose in order to test the patient's constitutional tolerance. On the day following the administration of sal-



varsan, mercurial injections or inunctions with potassium iodide should be given. It is preferable to employ mercury salicylate injections because of rapid action and general cleanliness. The first dose should never exceed a half grain. However, the drug should be gradually increased until constitutional tolerance has been attained. In hospital work three grains a week can be used, but in private practice mercurial injections should be limited to two grains a week. In all instances the patients should be carefully watched for untoward effects. The potassium iodide should be given in increasing doses, and it is remarkable how patients with cerebral syphilis can tolerate large amounts without showing constitutional symptoms. In this connection it is important to call attention to the fact that intraspinal treatment (Swift-Ellis and Ogilvie methods) of salvarsanized serum and mercurialized serum (Byrnes) are decidedly efficacious in the treatment of cerebral syphilis. Of course, proper cases must be selected for such treatment. In instances where acute inflammatory symptoms are intense, it is better to control them by ordinary methods before instituting the intraspinal therapy."

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## HOW SHALL LATENT SYPHILIS BE TREATED? THE PROPHYLAXIS OF SYPHILIS OF THE CENTRAL NERVOUS SYSTEM.

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Latent syphilis means that the individual affected shows no active or patent manifestations of syphilis, but that the virus has not been eradicated from the body and hence may later become actively patent. This latency is characteristic of syphilis and has been long recognized. Formerly one of the most fertile fields of argument, one of the points calling for the greatest clinical judgment, was the differentiation of latency from cure. Now by the aid of the Wassermann reaction it is somewhat easier to settle this point. While it is not by any means true that a negative Wassermann test on the blood serum means a cure, it will be well for the present discussion to consider that at least in the majority of cases reliance can be placed upon consistently negative Wassermann reactions on the blood-serum and a negative spinal fluid examination; and a patient giving these negative reactions can be regarded as free from syphilis. Our definition of latent syphilis in an individual will be this: A condition in which there are no discernible lesions or manifest symptoms except the positive Wassermann reaction. In latent syphilis we believe that the spirochete exists in the organism, but is not causing any discernible symptoms.

Various explanations are put forward to account for this phenomenon. By some it is held that the spirochete, whether protozoan or bacterial, has phases in its life cycle in which it causes no symptoms. By others it is believed that the body has gained the upper hand and eradicated all but a few spirochetes hidden in some secluded part of the body, where they live in symbiosis with their host, only to come forth at a favorable moment. However, it is not especially pertinent for us to consider these theories at this time. Let us rather consider the course of syphilis.

The primary stage characterized by a chancre and some lymphatic manifestations rarely causes more than local discomfort, possibly some malaise. There are some few exceptions to this, as the phagedenic chancres. However, as a rule, this stage is not dangerous to the life of the patient and it was formerly taught that treatment should not begin at this time. The secondary period again in the majority of cases frightens the patient more than

the physician, for with the exception of a small minority of cases giving rise to precocious nervous system accidents, the recognized symptoms are mostly cutaneous and the patient's life or effectiveness is not seriously endangered. It must be emphasized, however, that as Wile and Stokes, and others have shown, the central nervous system, or at least the meninges, are involved in a large percentage at this stage. Still serious accidents are very rare and the patients usually recover from the secondary symptoms with or without treatment. Because the patient so often showed no serious results without treatment, it was held by some syphilographers that treatment was not indicated. This is not intended as a historical survey of the treatment of syphilis, but will serve to emphasize the fact that, as a general rule, the early stages of syphilis do not disintegrate the organism. These stages are relatively benign. It is the later stages, the tertiary and so-called 'parasyphilitic' conditions that are such a great menace to the patient. But as a rule, there is a time between the secondary symptoms and the later symptoms when the patient shows nothing subjectively or objectively, except the positive Wassermann reaction and possibly pathological findings in the spinal fluid. This is the latent period. But this latent period is far from an assurance of safety. Syphilis is a disease characterized by remissions and exacerbations of symptoms. And it is for this reason that it is recognized that syphilis should be treated after symptoms have cleared up.

Fournier strove for many years to convince the medical profession that a syphilitic patient should be treated for at least two years after his infection, whether the syphilis seemed latent or patent. The method of treating only the symptoms he characterized as the opportunist method; treatment in the absence of definite symptoms the preventive method, as preventing the later manifestations. That prolonged treatment does prevent is shown by Fournier's figures analysing 2,396 cases presenting tertiary signs. These he divides into three groups: Group 1, comprising 1,878 cases, or 78 per cent. of the whole number, having no treatment or inadequate treatment, that is, mercury for less than one year; Group 2, comprising 455 cases, or 19 per cent., having moderate treatment, that is, mercury for one to three years; and Group 3, comprising the remaining 19 cases which only represent 3 per cent. of the whole number, having treatment for more than three years.

To-day we well recognize this necessity of adequate treatment, not judged alone by time of treatment, but by the symptomatic results controlled by the Wassermann reaction. All syphilographers advocate strenuous treatment after the infection until this is accomplished.



If, however, the patient does not follow the advice, discontinues treatment and shows no symptoms for a long period, the matter seems somewhat difficult. Let me ask what you would advise a patient whom you learn had a syphilitic infection five to ten years ago, who has had no symptoms following the secondary stage and who now has no symptoms except a positive Wassermann reaction in his blood-serum? I have put this question to several syphilographers. but as a rule have not received a direct reply. It may be stated that the attitude in general is to leave well enough alone. It is frequently stated that we are to treat the patient, not a laboratory reaction; why then disturb a patient when there are no symptoms. We, on the contrary, must agree with Craig in considering the positive Wassermann reaction a definite symptom of syphilis.

The thesis I wish to maintain is that these patients suffering from such latent syphilis deserve and are entitled to as thorough antisymphilitic therapy as though there were patent symptoms.

It has been stated above that the primary and secondary symptoms are relatively less important than the later conditions. These later conditions include general paresis, cerebrospinal syphilis, tabes dorsalis, angina pectoris, arteritis, aneurysm, cirrhosis of the liver, etc. These conditions seriously menace life and are only slightly amenable to treatment. The history, in all but very rare exceptions, is this: an infection with more or less prominent symptoms in the primary and secondary stages and then a period of *latency* lasting from months to thirty or more years, followed by patent symptoms of the severe disease conditions. There are a few exceptions where the usually late severe manifestations occur during the secondary period, but these 'precocious' cases are rare.

As previously stated, syphilis may be considered a disease of remissions and exacerbations, the latent period merely a remission, following which a severe lesion is to be expected. Therefore when we treat a patient having a positive Wassermann reaction during the period of latency, we are not treating the reaction, but rather the patient, for the purpose of curing him of a chronic disease and thus preventing a flare-up. We are treating the patient and not merely a symptom. To use Fournier's terminology, this is preventive treatment, not opportunist or expectant treatment.

Let us consider syphilis of the central nervous system, or neurosyphilis. In this group occur a number of clinical entities such as general paresis, cerebral and cerebrospinal syphilis, tabes dorsalis, gummata of brain, etc. These are nearly always late manifestations. As has been pointed out by White and others, secondary, skin and visceral lesions are seldom precursors of these nervous system diseases. Hence there is a long period of latency

during which the patient shows nothing but the positive Wassermann reaction.

It is to the point to ask, What percentage of patients infected with syphilis show central nervous system involvement, and what can be done about it? Probably the best figures on the incidence of neurosyphilis are those of Mautauschek and Pilcz. They traced 4,134 officers of the German army who had been infected with syphilis between 1880 and 1890, and found that by 1912 about 10 per cent. showed neurosyphilis. Figures of Fischer are similar. In actual figures general paresis alone, according to Salmon, was responsible for the death of one in nine of the 6,909 deaths in men between thirty-five and fifty years of age in New York for one year.

The second question is, What will treatment during the latent period accomplish? Unfortunately no definite figures can be given on this matter, because this investigation has never been actually carried out, but there is considerable evidence from which conclusions may be deduced to show that this treatment is of avail. Thus, if we look at the figures of Fournier quoted above, it will be seen that with adequate treatment the late manifestations are very infrequent. And now with newer methods, that is, salvarsan and the Wassermann reaction, it is reasonable to suppose that even better results will be obtained. It is true that the earlier the disease is treated, the easier the cure. However, the intermittent method of treatment used by Fournier is comparable to treating the later latent stage after a longer intermission from treatment. But even more to the point is the fact that even after the active manifestations of cerebrospinal syphilis have occurred, adequate treatment will generally cure; therefore it is logical to suppose that applied earlier it would have acted as a preventive.

In every case showing a positive Wassermann reaction, a lumbar puncture is indicated for the purpose of examining the spinal fluid. If this is positive, active treatment is very urgent. But negative findings in the spinal fluid are no evidence that cerebral involvement has not already occurred, for as Head and Fearnside have said, it is probable that when the process is entirely cerebral, the fluid remains negative, and in cerebral endarteritis the same is true. Still less is the negative fluid evidence that no later involvement may occur. At what stage in the disease the fluid first shows signs of active inflammatory process is entirely unknown. According to the theory advocated by Fildes and McIntosh, a sensitization of the tissue occurs early in the disease, and later the activity of a few organisms causes an intense reaction—a hyperallergia. If this theory be true, change from negative to positive spinal fluid

will occur rapidly, and a negative examination at one time is no guarantee of the condition to be found shortly thereafter.

So for the prevention of neurosyphilis alone, every syphilitically infected individual giving a positive Wassermann reaction deserves and is entitled to strenuous antisyphilitic treatment in order to prevent the later serious results of syphilis. Deductive and inductive reasoning allow us to maintain that treatment given during the latent period will really accomplish this prophylaxis against syphilis of the nervous system and general visceral syphilis.

In advocating the treatment of latent syphilis, the difficulties of carrying it out are not forgotten. There is the necessity of warning the patient of the possibilities of future disaster, with all that this entails—the great expense and inconvenience to the patient, and the absence of spectacular results which is inherent in prophylactic work. But the amount of good, the insurance against late manifestations, I believe, far outweigh the difficulties.

The two following cases well illustrate the dangers of expectant treatment and how ill-grounded is a feeling of security during the absence of manifest symptoms.

CASE I.—H. S., *æt.* twenty-nine. Patient was infected several years ago. He did not follow the prescribed treatment, as he felt well. He married two years ago. His wife has had no symptoms suggestive of syphilis. There were no abortions, miscarriages or stillbirths. There is one child. The Wassermann reactions on both mother and child are negative. In spite of the absence of symptoms, the patient worried about his infection and his failure to follow advice, so he sought examination at a syphilitic clinic. The Wassermann reaction was positive and arrangements were made for him to receive treatment. He paid for a salvarsan treatment, but because of the shortage of the drug on account of the war, it was decided not to give him the treatment but keep the drug for "a more urgent case," meaning the earlier, more active stage. It was not considered worth while to give him other antisyphilitic treatment. Ten days after the treatment was refused patient developed a cerebral thrombosis. He was brought to the hospital in a stuporous condition with a left hemiplegia. For a number of days he was not expected to live. The Wassermann reaction of blood-serum and spinal fluid was positive. Under active salvarsan, mercury and iodide treatment, his mind became clear, the Wassermann reaction became negative and the other spinal fluid findings became normal, but he was left with a hemiplegia sinistra. The production of the negative Wassermann reactions and the clearing up of the pathologic signs in the spinal fluid indicate that earlier treatment would have prevented this accident.

CASE II.—J. P., *æt.* forty-eight. Patient was infected with syphilis twenty-six years ago. He received pills for about three to four months. No other treatment. He was apparently well and married seventeen years ago. There was one child born sixteen years ago; no other pregnancies. The child born ten years after the primary infection, that is, during the 'latent' period, has since died of juvenile paresis. The patient, however, continued in good health until six months ago when he began to suffer from lancinating pains. On examination it was found that he had tabes with the classic signs and positive blood and spinal fluid, and symptoms of but six months' duration. Here again



we cannot help but feel that had his 'latent' syphilis been treated sufficiently during the nine years preceding marriage, there would not have been a juvenile paretic; or had his 'latent' syphilis been treated but a few years ago, he might not have developed tabes.

By treating latent syphilitics we believe that much can be done in preventing the later and more serious forms of syphilis. This offers a most important means of preventing tabes and general paresis. We believe, therefore, that the answer to the question, How shall we treat 'latent' syphilitics? must be—Treat the patient until a cure is obtained.

#### SUMMARY.

1. In the course of syphilis, the latent period represents merely a shorter or longer remission.
2. A positive Wassermann reaction, indicative of latent syphilis, is an indication for careful examination, lumbar puncture and anti-syphilitic treatment.
3. The primary and secondary symptoms of syphilis, in comparison with the later manifestations, are relatively benign.
4. Adequate treatment during the period of latency is insurance against dangerous or incurable conditions of the later stage. It is essential for the prevention of physical and mental disease.
5. Treatment should be continued until the patient can be declared cured.

## THE CONTROL OF SYPHILIS.

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DISCUSSION IN SYPHILIS SYMPOSIUM, CONGRESS OF AMERICAN  
PHYSICIANS AND SURGEONS, WASHINGTON, D. C.,  
MAY 9TH, 1916.

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A wide range for discussion is offered in the topics which have been so ably presented, but it would be difficult to engage all of them with any hope of adding much to the material furnished. With the idea of furthering the sociological feature of the program, some ideas might be presented which may have been overlooked.

In weighing the question of syphilis in its relation to society, meaning in the social economy of all people, there are two points which seem to stand out, the lack of control of syphilis and the effect this has upon those who have not voluntarily contributed to its spread—namely, those who may have acquired syphilis innocently, and those who have escaped it.

Almost the entire attention of those who work with syphilis and of those who write on syphilis has been devoted to the care and cure of syphilis; little has been actually accomplished in its control and in its prevention. We may admit that certain eugenic laws have been passed and promulgated with a view to disciplining those who have contracted the disease and that such laws may ultimately have their effect in protecting the children in some future generation, but the enforcement of these laws is going to be difficult and it is not hard to calculate that many will escape by one or another means.

The treatment of syphilis has improved enormously in recent years and the ability to make exact diagnosis has added materially to the possibilities of cure. Notwithstanding, the attack upon the sources of the disease has not yet been undertaken with sufficient force.

In a review of a large number of general hospitals, it was ascertained by the writer that practically all of them refused admission to early or incipient cases of syphilis, that the ambulant case was generally not wanted in the hospital and that all cases of syphilis, as such, were accepted on sufferance. The outdoor clinics everywhere show a great preponderance over the cases of syphilis in indoor services and, where any statistics could be had, the clinics

handle early syphilis almost always without the proper consideration of its danger to the community.

In spite of these facts, there are many hospitals which practise routine Wassermann tests for one or another reason, but apparently without any purpose directed at the control or prevention of the disease, so far as the early cases are concerned.

It can be stated as a very safe hypothesis that if every case of syphilis with a chancre or with an early eruption could be promptly hospitalized and treated under compulsion, the disease could be controlled far better than through any system of legislation regulating the report of cases or determining the eligibility of such for marriage.

If enough of those who deal with syphilis could reach this point of view, it is rather certain that the hospitals would help, for in the large majority of hospitals approached on this question, the very emphatic opinion was derived that the authorities considered the hospitalization of all syphilitics desirable.

There has been a consistent objection on the part of general hospitals to receive incipient cases, some institutions going so far as to exclude such with other acute communicable diseases. If syphilis is to be controlled, however, this viewpoint must change, for a provision for such cases in all general hospitals would offer the most potent means for the control of syphilis. Almost every physician attached to a venereal clinic could accomplish far more in the treatment of syphilis if all early cases were under prompt control.

Private patients with syphilis are more amenable to treatment and advice than those in public practice, but the latter need more regulation.

This phase of the discussion might be dismissed with the formulated propositions:—

1. All general hospitals should have special provisions for the indoor care of incipient or acute syphilis and all men who treat syphilis in public practice should encourage the enforced indoor care of such patients with the object of getting these subjects under prompt control and thereby to minimize the spread of the disease.
2. Legislation should be directed at enforcing the hospitalization of all cases of acute syphilis coming under public charge.
3. Educational movement should encourage the public to recognize syphilis among the communicable diseases, and amenable to isolation, just as are scarlet fever, measles, and other contagious diseases!

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The hospital control of syphilis and the methods of diagnosis and care are closely related, and no better means could be had for determining the best procedures than with the continued observation of cases constantly under care.



There is another feature of note in considering a more general hospital provision and care for syphilis and that is the educational side.

The discovery and wide use of the newer arsenical preparations in the treatment of syphilis has placed in the hands of the medical profession a group of powerful remedies with rather exact relation to the disease. There has not yet elapsed time enough to fix the value of these preparations, and yet the majority of the medical profession has grown to depend upon them in the treatment of the disease.

Former ignorance and timidity in treating syphilis have given place to a degree of rash use of these remedies which has not been wholly justified. Safety first is set aside for a cocksure confidence—often without proper estimate of the end-results.

The medical schools are not teaching syphilis adequately. Most of them confess this in the general discussion which has taken place in the past few years as to how and by whom syphilis should be taught. Most medical colleges leave the instruction to the different faculties as the subject may apply, and there are, as yet, few schools where syphilis is undertaken as a specific and essential subject.

All the more reason that the student and the physician should have the chance to study the disease at first hand among cases assembled in hospital wards under the direction of men qualified to teach the subject. The accidental or occasional obscure care of syphilis in a general ward offers little; and the transient case in the clinic affords only the casual observation of the disease, certainly not the exact study.

It is too early to argue for special hospitals for syphilis, for the public is not educated enough to see this necessity. This may come as the outgrowth of a more liberal provision in the general hospital and after the demand for accommodation of such patients will make a separate institution mandatory.

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The social side of syphilis has many divisions—the study of the relation of syphilis to the economics of the state would lead us into a number of by-paths, including the tax laid by this disease upon the public in the asylums and in the prisons.

The present diagnostic methods, which so readily determine exact cases and which clear up the obscure phases of syphilis, have already established the widespread and hitherto uncalculated hereditary types of the disease, many times wholly unsuspected.

It is here that the argument for syphilis prevention has its greatest force. The subject of syphilis in the innocent is not sufficiently stressed in the usual discussion. This question ramifies into industrial life, social organization and involves the community as well as the home. The delinquent school child, or the defective worker

of more mature years, may owe the continued obliquity to an unknown antecedent source of this character.

The responsibility of one case of innocent syphilis would be great; multiply such cases and the possibilities grow.

The enforcement of any law regulating the reporting of venereal diseases and especially syphilis will be difficult until there is some beginning with such reports from hospitals which receive such cases and which treat them in indoor or outdoor services. As a rule, a record is made of these cases and these records are available by the hospital authorities who can make the proper returns at regular periods. In time, such records may serve a useful purpose in checking up the spread of syphilis.

The report of cases of syphilis in private practice will require more education, of both the profession and the laity. The provisions for the regulation of marriage, through forbidding syphilitics the license to engage such a contract, have been so far the result of a ferment among health officials of mixed minds. The whole business is of doubtful efficacy, so long as the law is so arbitrary as at present. The strong conviction among the framers of such laws seems to be that syphilis is an incurable disease.

Gonorrhea is brought under the same ban as syphilis, because it is vicious. Cabot has very properly argued that any such legislation should be generally directed at disqualifying the unfit, and that any physical condition, whether due to syphilis, tuberculosis, insanity, or to any other cause should be considered.

The regulation of such eugenic propositions must bring the full force of the police powers of state health authorities to bear, before any actual results can be anticipated.

The State Health Boards have become advisers as well as protectors in sanitary matters. After all, the prevention of marriages among the unfit is only one phase of social hygiene.

If the medical authority in each state were given the right to supply health certificates, covering particularly the diseases which disqualify for marriage, then it would be an easy matter for the State Board of Health, through its medical and laboratory forces, to dispense such certificates after a thorough review of the applicant, including all laboratory tests essential to a proper examination.

Such a method would do away with the objections made by the profession, now so critical of those laws which fix the fee for examinations to determine syphilis.

The State Board not only has the equipment for such examinations, but it has some obligation at the same time.

At this time certain State Boards already offer their laboratories for the proper examination of pathological specimens; in many states, the health body makes it compulsory to have examinations made for diphtheria, typhoid, etc.

The additional advantage of a central bureau of record of all such persons as have had a board examination would make for a more systematic knowledge of the incidence of such diseases, and of syphilis especially.

To leave the certification of the condition of a supposed syphilitic to the average physician, upon his own examination, would soon nullify any law, for no system of report could be assured and no standard test could be enforced.

If state legislation regulating marriage required that all individuals party to such contract, whether man or woman, should file a certificate of the State Board of Health, declaring his or her state of health, and if such legislation provided that the unfit could not be licensed to marry, then syphilitics among other unfit could be barred.

The moral effect of such laws is the greatest after all, for the knowledge of such a requirement would have an early influence in deterring those who might contract diseases, such as syphilis, and it would prevent many who are cognizant that they have or have had syphilis from attempting marriage. The public record of persons with such diseases, too, would largely influence those with disease against marriage. In these respects, such legislation would be of large value in the way of prevention.

We are all apt to be hesitant over too radical a step in the regulation or control of syphilis, because in the field of preventive medicine to select one disease among a number which menace society is not truly scientific. The excuse we offer to ourselves is that syphilis is different because it is usually vicious and, more than that, the very nature of its occurrence under conditions of venereal indulgence has occasioned its spread without the same means of control which might apply to diseases of more innocent origin. The obligation rests upon the medical profession, for with it lies the means of prevention. Until now, the physician has taken no part in the moral or sociologic phases of syphilis. He has simply taken the point of view that his duty lay rather in remedying the physical side where he could, and he has left the rest to the patient, to whom the moral question has seldom appealed.

The natural demand of the public has come for the better protection of the future generations.

We may go on devising improved methods of diagnosis and of treatment and cure, and there will probably always be need for such devices. For some years to come we will need to provide for the derelicts in the wake of syphilitic invasion as found among our more and more refined civilization, but the time has come when the control of the incidence and spread of syphilis must be undertaken for the sake of the home and the community as represented by the economical phases of social and industrial life. The generally credited 20 to 25 per cent. morbidity from syphilis in the United States is a grave charge against our morality.



THE MARGIN OF ERROR IN THE WASSERMANN  
REACTION.

(A Study of 1,000 Tests Made Independently by Two Laboratories.)

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## INTRODUCTION.

For many reasons a great deal of suspicion has been cast upon the Wassermann reaction for syphilis, ever since this test was introduced by Wassermann, Neisser and Bruck. The reasons for this are very clear to one who has been over the ground during the last decade.

In the first place, the reaction was found to be easily rendered negative, at least temporarily, by a moderate amount of mercurialization, or salvarsanization, or both. This seemed in accord with what one might expect, inasmuch as both drugs are specifics, and would naturally have some relation to the presence, in the blood-serum, of the substance, which the Wassermann reaction stamped as diagnostic. Consequently, the clinician gradually became accustomed to the varying degrees of positivity in the serum of cases under treatment.

Then followed the phenomenon noted by Gennerich and well worked out by Craig—the phenomenon of provocation of the Wassermann reaction. When it was found that, following a few doses of mercury or the administration of salvarsan, a serum, previously negative, might show a positive Wassermann reaction, considerable suspicion was cast upon the test. This matter, however, had gradually righted itself, when two articles appeared in which mere suspicions, previously held, were voiced in systematic form.\*

These investigations were based upon series of Wassermann reactions done upon specimens of blood taken from patients, divided

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\*Wolbarst: A Further Clinical Study of the Contradictory Findings in the Wassermann Test. (A Study of 134 Sera.) (*Interstate Med. Jour.*, February, 1915.)

Uhle and MacKinney: Comparative Results of the Wassermann Test, A Clinical Study. (A Study of 325 Sera.) (*Jour. Amer. Med. Assoc.*, September 4th, 1915, Vol. LXV, p. 863).

into two or more portions, kept under approximately the same conditions and tested by two or more laboratories. The reports of these investigations were then tabulated, and a very large percentage of these tests showed such divergence in results that the authors concluded the Wassermann reaction was unsatisfactory, as competent laboratory workers could not agree in their results in a large enough percentage of cases to make the test worth while.

In beginning this work we reviewed the ground for our own interest, inasmuch as doubts had been raised in our minds by such assertions. In order to satisfy ourselves, we tested several hundred sera and having obtained very satisfactory results, we extended the investigation to 1,000 sera practically with the same results.

#### TECHNICAL CONSIDERATIONS.

It may seem unusual to one who has not worked in serology that there should be any divergence at all in results if two laboratories employ an authorized technique. For instance, in titration of chemical materials such as hydrochloric acid, it is not possible for two laboratories working independently to vary more than a few points in their results. In the Wassermann test we have a process not entirely different, but at least somewhat so. Here we are titrating also—titrating for the amount of complement that a given amount of human serum will deviate, *i. e.*, render inert as far as the ultimate reaction (hemolysis) is concerned. But contrary to the chemical and fairly fixed process which deals with materials that can be weighed, measured and which remain more or less stable, we are dealing in serology with materials which for the most part are biochemical bodies, and which easily deteriorate and are difficult to standardize accurately.

Again, the Wassermann test, as it was originally devised, used materials, all of which had the three above-mentioned characteristics, whereas the test as practised at present by most of the representative laboratories, has substituted a stable lipoid antigen for the unstable watery emulsion of the original workers.

An analysis of the technique of the two laboratories making this report shows that they agree in the following essentials:—

They read results in the amount of complement deviated, *i. e.*, only one amount of antigen is used. In order to do this, they deal with sufficient complement and cells so that there is a large volume of the final mixture in the tubes and the resultant reaction is macroscopic and the reading easy.

They use an antigen which has a large anticomplementary range.

They use two to two and one-half times the unit of complement necessary in the hemolytic system.

## TECHNIQUE OF THE TWO LABORATORIES.

## BOARD OF HEALTH.

*Antigen.*—

An acetone insoluble fraction of the lipoids of beef heart (Noguchi's antigen). This is dissolved up to 3 per cent. strength in ether and methyl alcohol, and this stock solution which is stable is titrated occasionally. For use it is daily emulsified in 14 volumes of 0.9 per cent. sodium chloride solution, so that 0.1 c.cm. (the amount used in the tests) will deviate the complement tested with a number of positive sera. This emulsion must not of itself be hemolytic in 0.5 c.cm. amounts. It also must not of itself deviate the complement unit in 0.6 c.cm. amounts. The emulsion must be freshly made for each day's work.

*Patients' Sera.*—

These are separated after clotting, with as little delay as is convenient; before being tested they are heated to 56° C. for thirty minutes. Sera become anticomplementary with age, and become so much sooner if left with the blood-clot or if infected. This does not ordinarily interfere with the accuracy of the test, as only a tyro could read an anticomplementary test positive, but occasionally thermostable bodies are found which cause spurious positive reactions in the presence of antigen.

*The Complement.*—

This is preferably the mixed serum of several guinea-pigs. The blood of guinea-pigs that produce two parts of serum to one of clot had better be discarded, as the serum is likely to be hydremic and low in complementary qualities. This is extremely important when only a few tests are to be done and the blood of one animal is sufficient. It has been our experience that use of large amounts of such complement will not give the accurate results that normal amounts of normal serum will give. The complement should preferably be used the same day that it is drawn; it may, how-

## VANDERBILT UNIVERSITY.

*Antigen.*—

The first 535 tests were done with an acetone insoluble fraction of human heart, prepared after the method of Noguchi, and conforming to all the requirements suggested by him. The remaining 465 tests were made with a specimen of acetone insoluble antigen made of beef heart, prepared after the method of Coca and L'Esperance (*Arch. Int. Med.*, Vol. XI, No. 1, p. 891), which is the same as that of Noguchi, with the exception that the stock solution is a 2 per cent. solution of the acetone insoluble fraction. Through the courtesy of Dr. Herman Spitz, of Nashville, who furnished me with the latter specimen, I was enabled to use antigen prepared by different workers.

*Patients' Sera.*—

Blood is drawn from the arm of the patient, placed in a sterile container, slanted, and put on ice until the morning of the test, at which time the container is centrifuged if necessary and the serum is transferred to a sterile vial, which is then heated in a water bath at 56° C. for thirty minutes. All sera showing bacterial contamination are discarded as unfit.

*The Complement.*—

On the morning of the test two or more guinea-pigs are bled from the heart with a Luer syringe. Eight c.cm. of blood is taken from each pig. The sera are separated by centrifugalization and then mixed and diluted up to 5 per cent., which is the strength dilution used in the test. This 5 per cent. complement mixture is titrated against the amboceptor-cell-mixture to ascertain the unit of complement necessary to complete hemolysis. Exactly twice this amount, or two units, is used in the test. Within limits the fluid volume of the complement dilution used is of no consequence. The point of consideration is its complementary strength or



ever, be kept undiluted, but well corked on ice for twenty-four hours.

*The Amboceptor.—*

We prefer rabbit serum immune to sheep red blood cells. We prefer an amboceptor of which one c.cm. will sensitize 25 c.cm. of the sheep red blood cells (not sheep blood), although we can work with an amboceptor three times as weak as this. If the amboceptor is four or five times as weak as this, the results are not as a rule accurate, even though one uses the appropriate amount of this weak amboceptor.

*The Sheep Red Blood Cells.—*

These are obtained by catching the blood in as cleanly a manner as possible in a sterile glass vessel containing glass beads. It is preferable that the large vessels of the neck of the animal be cut without injuring the gullet in order that debris be avoided. The blood is then defibrinated by shaking for a few minutes. This fluid blood is then washed in 0.9 per cent. salt solution three times before using it. It is then thrown down by centrifugalization at high speed in a graduated tube until it will not pack further (usually ten to fifteen minutes). The reading is then made and this packed blood is diluted to a 5 per cent. emulsion. We prefer fresh blood, but have been able to use formalized blood several weeks old to very good advantage.

*Mechanism of the Test.—*

In beginning the Wassermann test the quantity of amboceptor necessary to sensitize 0.5 c.cm. of 5 per cent. sheep cell emulsion to .05 c.cm. of guinea-pig serum is determined. Then four units of amboceptor are used. We prefer to make up the resultant amboceptor-cell mixture in bulk. In using four units we are following the technique learned by one of us in some of the representative German laboratories. The rationale of this is as follows: If a series of tubes be arranged, each containing 0.5 c.cm. of the amboceptor-cell-mixture, and to

power to hemolyse. I have used as little as 0.015 c.cm. and as much as 0.06 c.cm. with constant results.

*The Indicator.—* (Amboceptor-sheep blood-mixture.)

Blood is drawn from the jugular vein of a sheep with a Luer syringe on the morning of the test, and expelled into ten volumes of 0.85 per cent. sterile salt solution. This is then thrown down in a high power centrifuge, washed twice in saline, placed in a graduate centrifuge tube and centrifuged at 1750 revolutions per minute for four minutes. The volume of the cells is now read and diluted to a 5 per cent. emulsion with saline. Anti-sheep rabbit serum, the titer of which is ascertained in the ordinary manner (see Board of Health method), to the amount of two and one-half units for each 0.5 c.cm. of 5 per cent. sheep cells, is diluted with saline to a volume equalling the 5 per cent. cell emulsion; the two are added rapidly, thoroughly mixed and incubated for thirty minutes at 40° C. in a water bath. These sensitized cells are washed twice in saline and made up to a two and one-half per cent. emulsion. This emulsion (indicator) is then titrated against complement, to determine the complementary unit. The titration is shown in the following protocol in which the unit is 0.4 c.cm. of a 5 per cent. complement solution.

Indicator		Result.
Complement.	Emulsion	
5 per cent.	2½ per cent.	
0.1 c.cm.	1.0	NH
0.2 c.cm.	1.0	SH
0.3 c.cm.	1.0	PH
0.4 c.cm.	1.0	CH
0.5 c.cm.	1.0	CH
0.6 c.cm.	1.0	CH
0.7 c.cm.	1.0	CH
0.8 c.cm.	1.0	CH
0.9 c.cm.	1.0	CH
1.00 c.cm.	1.0	CH

*Mechanism of the Test.—*

The following protocol showing an anticomplementary control, antigen

each of these there be added 5 per cent. complement in amounts varying from 0.1 to 0.7 c.cm., each tube containing 0.1 c.cm. more than its predecessor, it will be found that the point of hemolysis of such a four unit amboceptor-cell-mixture will lie very close to 0.5 c.cm., or in other words, the amount of complement used by us in our tests will agree with the serological dictum that two units be used. The protocol which follows Noguchi fairly well demonstrates the rest of the Board of Health's technique.

Incubate for  $\frac{1}{2}$  hour in 37.5° C. water bath.

Patient's Sera.	Antigen.	Comple- ment.
0.1 c.cm.	0.1 c.cm.	1.0 c.cm.
0.05 c.cm.	0.1 c.cm.	1.0 c.cm.
0.1 c.c.	—	1.0 c.c.

Incubate for  $\frac{1}{2}$  hour in 37.5° C. water bath.

Amboceptor Cell-Mixture.	Result.
0.5 c.cm.	These tubes show varying reactions according to the nature of the serum.
0.5 c.cm.	Complete Hemolysis.

A positive and a negative control serum is, of course, added to each day's set of tests.

and Bauer control tube shows the mechanism of my procedure:—

Patient's Sera.	Com- plement 5%	Antigen 1.20	Washed Sheep Cells 2½ %
0.2 c.cm.	2 units	0	0
0.1 c.cm.	2 units	0.1 c.cm.	0
0.05 c.cm.	2 units	0	1.0 c.cm.

These are incubated for thirty minutes in a 40° C. water bath, at the end of which time 1 c.cm. of the indicator emulsion is added to each of the anticomplementary control and antigen tubes and incubation continued for thirty minutes longer. If the Bauer control tube shows complete hemolysis at the end of the first incubation, then in place of the indicator we use 1 c.cm. of 2½ per cent. washed unsensitized sheep cells in the anticomplementary control and antigen tubes and continue incubation as in the first case. Each day's tests are controlled by a positive and a negative sera.

### THE READINGS.

Inasmuch as the comparison of 1,000 tests is a clinical comparison, we have decided to use the terms that we use in reporting the serum to the clinician. This is as follows: A serum is reported as either strongly positive, moderately positive, weakly positive or negative. We are accustomed to consider the first two as diagnostic, and the third as of importance only in cases under treatment or in cases which have an initial lesion but have, as yet, developed no secondaries.

These rules are important, for example, if one laboratory reports a serum negative and the other reports it weakly positive, we consider that they agree, unless some of the above factors can come into play. Again, if one laboratory reports moderately positive and the other weakly positive, we record the former positive and the latter negative in our statistics.

*Statistics in 1,000 Tests.*—In this study we tested 981 specimens

of blood-serum and 19 spinal fluids. Of these 1,000 specimens the Board of Health reported 218 positive (21.8 per cent.), while the Vanderbilt laboratory reported 223 positive (22.3 per cent.). This would seem to show that neither of the two laboratories showed a tendency to bring out the positives to a much greater extent than its colleague.

For purposes of more critical study we have divided the 1,000 specimens into three series as follows:—

Series I.—(372 Specimens.) In testing these, each laboratory used their own methods and reagents throughout.

Series II.—(284 Specimens.) In testing these, each laboratory used their own methods and reagents throughout, but in addition, used the antigen of the other laboratory.

Series III.—(344 Specimens.) Each laboratory used their own methods, but the reagents (sheep-blood, complement and amboceptor) were furnished by one laboratory on alternate days, in order that both laboratories would be using the same reagents at the same time. This was carried so far that even complement and sheep-cell mixture were made up to 5 per cent. strength, and then divided into two parts, in order that any error that might occur in diluting, might be avoided.

TABLE I.

Results Obtained in 1000 Wassermann Tests When Each Laboratory Used Its Own Reagents.

Reports Agreed In:		Board of Health report	Vanderbilt report
		showed increased	showed increased
		positivity in:	positivity in:
per cent.		per cent.	per cent.
Series I—343 cases...	92.2	13 cases.....	16 cases.....
Series II—267 cases...	94.	11 cases.....	6 cases.....
Series III—325 cases...	94.5	6 cases.....	13 cases.....
935	93.5	30	35

TABLE II.

Results Obtained in 628 Wassermann Tests When Both Laboratories Used the Antigen Supplied by the Board of Health.

Reports Agreed in:		Vanderbilt report	Board of Health re-
		showed increased	port showed increas-
		positivity in:	ed positivity in:
per cent.		per cent.	per cent.
Series II—266 cases...	93.6	7 cases.....	11 cases.....
Series III—327 cases...	95.	14 cases.....	3 cases.....
593	94.3	21	14



TABLE III.

Results Obtained in 628 Wassermann Tests When Both Laboratories Used the Antigen Supplied by Vanderbilt.

Reports Agreed in:		Board of Health re-	Vanderbilt report
		port showed increas-	showed increased
		ed positivity in:	positivity in:
	per cent.	per cent.	per cent.
Series II—266 cases...	93.6	13 cases.....	5 cases.....
Series III—330 cases...	95.9	2 cases.....	12 cases.....
	596	15	17
	94.7		

## SUMMARY.

The above described investigation and its tabulated reports seem to merit the following conclusions:

1. The results in Wassermann reactions carefully carried out with proper technique by two laboratories should yield a very high percentage of agreements. In our hands this reached 93.5 per cent. in 1,000 tests.

2. The index of error while not negligible would appear to be small. In our hands it amounted to 6.5 per cent. in 1,000 tests.

3. Some of this error is due to the difficulty in the standardization of the sheep blood the complement and the amboceptor, inasmuch as higher results were obtained when both laboratories used the same reagents. (Compare results in Table I, of Series I with Series III.)

4. More of this error was eliminated when in addition to this the same antigen was used by both laboratories. (Compare the results of Series III in Tables I, II, and III.)

5. We believe it advisable that two or more specimens of Noguchi's acetone insoluble fraction antigen be used in the Wassermann reaction.

## TWENTY-FIVE CASES OF EXTRAGENITAL SYPHILITIC INFECTION.

By H. H. HAZEN, M. D., of Washington, D. C.,

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Although it is generally recognized that extragenital syphilitic infections constitute over 5 per cent. of all infections with this disease, still a brief review of the location of the chancres is still of interest. Bulkley<sup>1</sup> gives the following list.

	United			United	
	World	States		World	States
Lips .....	1810	107	Anus .....	87	1
Breast .....	1148	28	Perigenital .....	77	1
Buccal Cavity .....	734	17	Legs .....	73	2
Fingers .....	462	75	Forearms .....	59	5
Eyelids .....	372	30	Neck .....	47	1
Tonsils .....	307	26	Gums .....	42	9
Deep Throat .....	264	10	Forehead .....	37	3
Tongue .....	157	11	Ears .....	27	3
Chin .....	146	6	Vaccination .....	1863	887
Cheeks .....	145	19	Venesection .....	745	
Trunk .....	100	1	Circumcision .....	179	6
Nose .....	95	7	Tattooing .....	82	42

Fournier<sup>2</sup> gives the following locations for 1,124 extragenital chancres;—

Lips .....	567	Forehead .....	2
Tongue .....	75	Scalp .....	3
Tonsils .....	69	Arm and Hands.....	78
Gums .....	11	Anus .....	77
Buccal Cavity .....	5	Breasts .....	59
Chin .....	54	Trunk .....	33
Cheeks .....	24	Lower Limbs .....	14
Eyelids .....	21	Neck .....	14
Nose .....	18		

Montgomery's<sup>3</sup> 55 cases were located as follow:—

Lips .....	25	Abdomen .....	5
Tongue .....	3	Breast .....	1
Gums .....	1	Nates .....	1
Mouth .....	1	Arms .....	3
Tonsil .....	1	Fingers .....	7
Cheek .....	1	Wrists .....	1
Eyelid .....	1	Forearms .....	2
Neck .....	1	Back of Hand.....	1

In 61 cases Colé<sup>4</sup> noted the following distribution:—

Lips .....	43	Jaw .....	1
Tongue .....	1	Both Breasts .....	1
Tonsil .....	3	Abdomen .....	1
Neck .....	1	Hands .....	10

In my 25 cases the lesions were distributed as follow:—

Upper Lip .....	4	Anus .....	3
Lower Lip .....	5	Fingers .....	3
Cheek .....	2	Foot .....	1
Nose .....	1	Arm .....	1
Tonsil .....	4	Incision .....	1

The following is a more detailed account of the cases, as several were extremely interesting.

CASE I.—Chancre of upper lip, white male, aged thirty-five, probably acquired by kissing.

CASE II.—Chancre of upper lip, white male, aged twenty-five.

CASE III.—Chancre of upper lip, white female, aged twenty-two. This patient first had an eczema of the upper lip, and after this had persisted for about three months a chancre developed in it.

CASE IV.—Chancre of upper lip, white male, aged thirty-eight.

CASE V.—Chancre of lower lip, white male, aged twenty-six.

CASE VI.—Chancre of lower lip, white female, aged eighteen, acquired from kissing.

CASE VII.—Chancre of lower lip, white male, aged twenty-eight.

CASE VIII.—Chancre of lower lip, white female, aged eighteen, acquired from kissing.

CASE IX.—Chancre of lower lip, white male, aged forty.

CASE X.—Chancre of cheek, white woman, aged forty. The patient stated that she had wiped her cheek on a towel that had been used by a syphilitic.

CASE XI.—Chancre of cheek, white male, aged seventeen, acquired by kissing.

CASE XII.—Chancre of nostril, white physician, aged forty-five. This patient had been intubating a child that had syphilitic lesions of the throat, and the child coughed in his face. About four weeks later the chancre developed.

CASE XIII.—Chancre of tonsil, white male, aged thirty-five.

CASE XIV.—Chancre of tonsil, white male, aged forty.

CASE XV.—Chancre of tonsil, white female, aged twenty-five. This case had been treated for three weeks for Vincent's angina by an excellent nose and throat specialist.

CASE XVI.—Chancre of tonsil, negro female, aged twenty-two. Curiously enough this is the only instance of extragenital chancre that I have seen in a negro although I have encountered at least twice as many cases of syphilis among the blacks as among the whites.

CASE XVII.—Chancre of the anus, white male, aged fourteen.

CASE XVIII.—Chancre of the anus, white male, aged sixteen. Both of these cases of chancre of the anus had been seduced by a white man, who was already the victim of syphilis.

CASE XIX.—Chancre of the anus, white male, aged twenty-one. This boy was a student in one of our colleges, and how the infection was acquired still remains a mystery. He was first seen by a rectal specialist, who diagnosed thrombosed piles, for which he operated. Later a typical eruption appeared which was declared to be a 'stomach rash.' The chancre of the anus had been



incompletely removed and soon recurred, presenting the typical appearance of an extragenital chancre.

CASE XX.—Chancre of the finger, white male, aged twenty-three. While on a drinking bout he had struck a prostitute across the mouth, cutting his knuckles upon her teeth. In due course of time a typical chancre developed.

CASE XXI.—Chancre of finger, white physician, aged thirty-two. He had been attending a woman for a syphilitic ulceration upon the cervix.



Fig. 1. Case XXII, chancre of finger in a physician.

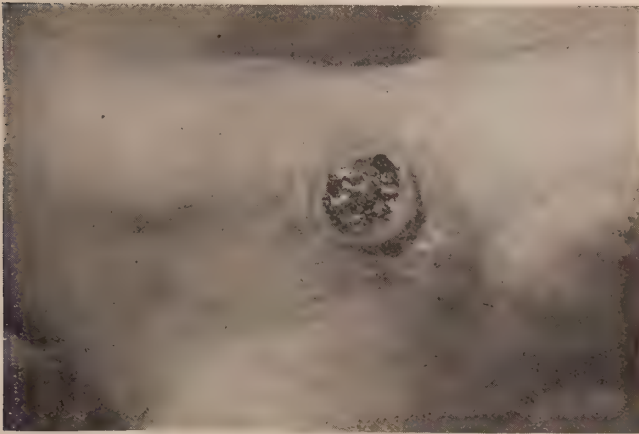


Fig. 2. Case XXIII, chancre of foot.

CASE XXII.—Chancre of finger, white physician, aged forty-one. He had made an examination for adenoids with an ungloved hand, and had probably acquired the disease in that way.

CASE XXIII.—Chancre of side of foot, white female, aged twenty-six. For five weeks before the chancre developed this woman had been a patient in one of the local hospitals, because of a ruptured extra-uterine pregnancy. Although her life had been rather irregular, the probabilities would seem to be that this lesion was acquired while in the hospital. It should be remarked in passing that chancres of the foot are extremely rare, although Buehler<sup>5</sup> and others have reported instances of lesions in this situation.

CASE XXIV.—Chancre of the arm, white boy, aged twelve. This lesion appeared in the site of vaccination, about five weeks after this little operation was performed.

CASE XXV.—Negro, male, aged twenty-three, interne at one of our hospitals, was assisting in an operation upon a syphilitic patient. He pricked his finger with a needle, and four weeks later developed a typical papular eruption, although at no time was there any evidence of a chancre. Fordyce<sup>6</sup> has recorded a similar instance.

Not one of these chancres was recognized until it had lasted for more than three weeks, and in most instances not until the secondaries appeared. At the present time there is not the slightest excuse for the failure to diagnose an extragenital chancre. In the first place, the appearance is almost absolutely characteristic, except in chancres of the tonsil; in the second place, the dark field illuminator will usually reveal the causal organism, and, in the third place, the Wassermann test becomes positive in many instances before the close of the second week. The deep red color, the induration, and the chronicity should always make one suspicious of any chancre before the infection has become generalized. This is the time for treatment. The marked adenopathy in the draining glands is also of extreme importance, but the diagnosis should be made before palpable glandular involvement occurs.

Physicians are undoubtedly entirely too careless for their own good. Syphilitic infection in a medical man ought to be a rarity, and not a common occurrence. Rubber gloves are cheap and effective.

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- <sup>4</sup> Cole (Personal communication).
- <sup>5</sup> Buehler (*Jour. Cutan. and Gen. Urin. Dis.*, 1902, Vol. XX, p. 110).
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## THE NAMING OF SYPHILIS.\*

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By DOUGLASS W. MONTGOMERY, M. D., of San Francisco.

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The names given to a disease are of much more interest than simply the titles. In syphilis, for instance, they often convey the dominant idea of the sponsor person or nation, and so throw an historical light on the disease, or project a symptom into relief in a way not otherwise appreciated. One set of names may indicate where it was thought the disease originated, while others may allude to external symptoms, or to the parts affected, or to the supposed cause of the disease, or to its mode of propagation, and are therefore of interest as a contrast or as a substantiation to our present views on these subjects. In addition to this, many refer to the aid sought in prayer from the saints, and therefore form an interesting chapter in that pathetic illusion.

Iwan Bloch has shown conclusively that syphilis was introduced into Europe by the returning sailors of Columbus.\*\*

When such a highly contagious disease, having marked external manifestations, suddenly appears in a country, it is natural that it should receive a great number of appellations, and this is exactly what occurred with syphilis. As Bloch says, within five years, from 1495 to 1500, all of its chief names were formed, and there are more than four hundred of them. A full enumeration of these would be about as interesting as a dictionary, and furthermore many of them are merely variants of one another; therefore only a few will be considered in this paper.

In Europe, five hundred years ago, it was not customary for a whole people to go to war. It was then more the personal affair of the chief political leader, who happened to control the army and the taxes. This leader gathered his troops as professional fighters from all quarters of Europe. Consequently it so happened that when Charles VIII of France undertook an expedition into Italy in 1494, his army was composed of Frenchmen, Swiss, Italians, Germans, Spaniards, Hollanders, and Flemings.† The destination of this choice band of ruffians was the Kingdom of Naples, to which Charles thought he had a right. The cup of life, however, is always variously mingled, and although the object, the ideals and the constituents of this expedition seem to have been normally sordid, cruel

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\*Read before the Innominate Society, January 17th, 1916.

\*\*Iwan Bloch: *Der Ursprung der Syphilis*. Jena, 1901.

†The Italian campaign of Charles VIII occupied the last of 1494 and the first part of 1495. *Loc. cit.*, p. 33.



and mean, it contained at least one notably good man—Bayard, the knight ‘without fear and without reproach.’

Bayard had the qualities of bravery, generosity, gallantry and shrewdness so justly proportioned in his composition as to be what Robert Louis Stevenson would call “a bonnie fighter.” He must have been about twenty-five years of age at the time of this expedition, and therefore was at his very best both for giving blows and taking in ideas. The *nova ægritudo*, the new disease, the *scabies inaudita*, the novel scabies, that broke out so fiercely at the siege of Naples, excited his lively curiosity, and all the more so as no one was able to give it an authoritative name. A designation, however, it had to have, and Bayard called it “le mal de celui qui l’a,” the disease of the man who has it.

When one reflects on the multitudinous phases of this Proteus of diseases, scarcely attacking any two individuals alike, the warrior’s name is not so bad. It is indeed the disease of the fellow who has it, and in that day when its course was so much more virulent, it must have possessed the patient entirely and individually. How entirely this possession is, was recently demonstrated to me by Noguchi in the swarming spirochætosis of a slide of the cardiac muscle, prepared by Warthin, of Ann Arbor, from a man who died suddenly in the full spirochætemia of early constitutional lues.

Although the army had such a various composition, yet it was a French expedition, and it was only natural that the new malady should receive as its chief designation, the name French disease, or *morbis Gallicus*. It was just as natural that by some it should be called the Neapolitan disease, because it first broke out as an epidemic at the siege of Naples, or that the name of the whole country should be given to it, as the *Morbis Italicus*, or the *passio Italica*.

There was still another circumstance that made Italy a special focus for the spread of the infection. Rome, the holy city, was the center for the Catholic Church, and consequently all the business of that great institution, and the multitudinous pilgrimages characteristic of that time brought to it large numbers of travelers from all parts of Europe. For instance, Zenon Grosseck has shown that syphilis was first carried to Cracow in the year 1495 by a returning pilgrim.\*

It was in reading Grosseck’s account of this incident that I for the first time became aware of how speedily a disease like syphilis can become dispersed. Until then I had always held that as syphilis was conveyed by actual contact alone, its dispersion throughout a group of nations must necessarily be slow, and that the time allowed between the return of Columbus’ expedition, March 15th, 1493, and the appearance of the disease in distant parts of Europe,

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\*The First Appearance of Syphilis in Poland (*Dermatologische Zeitschrift*, May, 1914, p. 428).

was too short. I had failed to appreciate the means Nature has taken to spread this most terrible of all diseases. In the first place she connects the contagion almost obligatorily with sexual desire, which with hunger, forms the two great impelling motives of the human being. In addition to this she disseminates the malady through the active intercommunications stimulated by war, commerce and religion.

Besides spreading from Italy, the disease would also be carried from one country to another along the usual commercial routes. In Portugal, for instance, it was called the Castilian disease, as it naturally traveled westward from Castile. Just as naturally the Poles called it the German disease, the Russians called it the Polish disease, the Turks called it the Frankish or French disease, and the Persians, the Turkish disease. In North Africa, on account of being introduced from Spain, it was called the Spanish disease. The geographical names of syphilis, therefore, support the view that the disease was a new importation, and their general trend indicates its spread from Spain and Italy. Why conditions in Italy especially favored its distribution over Europe have been mentioned; the Spanish mercenaries introduced it into the polygenic army of Charles VIII, which, on disbanding, carried it to its several native countries, and, in addition to this, Rome, the mother of nations, furnished continuous and frequent opportunities for its distribution.

Another prolific source of names for syphilis was the habit characteristic of those times to differentiate diseases solely on their external appearances, and syphilis presented for such ingenuity a most variegated assortment of eruptions.

In considering this point it must be remembered that all the great physiologic and pathologic processes were then absolutely unknown. It is true that some few guesses had been hazarded in regard to the circulation of the blood, for example, by the Spanish veterinarian, Francisco de la Reyna, or even a clear demonstration, as of the pulmonic circulation, by that stormy-spirited Spanish theologian, Servetus, yet no application of its principles to medicine was made till the time of Harvey, two hundred years later (1628). That other great function, respiration, had to wait for Priestley (1773-1804) to discover oxygen, and for Lavoisier (1743-1794) to apply it to the processes in the lungs. As for calorimetry, even I can remember older physicians who scoffed at the use of the thermometer as a toy. Now the medical profession tends to the other extreme, and physicians and surgeons are so intent on getting at a visualization and comprehension of the action of the great viscera, that they are blind to all external manifestations, especially to those that transpire on the skin.

With such an accentuation on the importance of the external

manifestations of disease as obtained when syphilis was first introduced into Europe, it is not strange that smallpox should be correlated with syphilis. The widespread pustular syphilide of early constitutional lues resembles the main eruption of smallpox in its great characteristics of being pustular, of being abundant, of being widespread, and in each pustule having an infiltrated, indurated base. This last characteristic of having substantial body, that may be seen as well as felt, will appeal to every man versed in dermatology. Although the men of the Renaissance may not have appreciated this substantiality by methodically palpating it, they were too sharp-eyed artistically not to have seen it.

The name 'variola' appears first to have been given to smallpox in the epidemic that visited France and Italy in the year 570 A. D. From this word through *vayrola* arose the old French name, *vérole*. When syphilis appeared on the scene, it also, as in one of its stages a markedly pustular disease, received the name, *vérole*. The resemblance of a case of smallpox to a pustular syphilide, especially in the afebrile stage, just previous to the occurrence of the secondary fever, may be serious. On the other hand, a widespread pustular syphilide accompanied by fever and muscular pains may closely simulate smallpox. Imagine a physician of the Renaissance getting such a case in which the eruption would go on enduring long after the time when a case of smallpox should have evolved either in death or recovery, and in which furthermore the large ecthymatous, deeply ulcerative forms might predominate. Both from the size of the individual lesions and from the long endurance of the malady, and therefore its evident obstinacy to treatment, the physician would call it *la grosse* or *la grande vérole*. This similarity, yet difference, in names, would enable him to hold to his diagnosis of *vérole*, and also would permit him to save his face and the reputation of his medicines. One of the most adept practitioners I have ever personally met was a master in the art of saving his face in this manner. Syphilis being called the great pox or *la grande vérole*, antithetically smallpox would be called *la petite vérole*. Gradually in syphilis the epithets *grande* and *grosse* were dropped, and the term, *la vérole* or 'the pox' became the usual designation, while with *la petite vérole* or 'the smallpox,' the epithet clung.

A good story is told involving a play on the words *grande* and *petite*.

One of the courtiers of Francis I whispered to another, "The king has *la vérole*."

"Which," was interrogated, "*la grande* or *la petite*?"

The courtier-like answer was not delayed: "The king never has anything small."

The substantiality of the luetic lesions, especially of the papular and of the late infiltrative forms, which has been previously men-



tioned, and of which every syphilographer is almost unconsciously aware, received striking attention in one of the farcical names of syphilis, *boutons sans fleurs*, buds without flowers. Later in the history of medicine an attempt with all due seriousness was made to classify skin diseases according to their efflorescent forms, as had been done for plants in botany.

Scabies, an appellation originally given to any scabby-crusted eruption, was one of the favorite early names of syphilis. It was called a venereal scabies, an *inaudita* or novel scabies, *scabies gallicana* or French scabies, and still others went so far as to imagine syphilis to be a cross between leprosy and scabies.

The similarity that may exist between syphilis and the parasitic disease, we now term scabies, may be provokingly close. There may be the same widespread pustular eruption, with swelling of the superficial lymphatic nodules from pyogenic infection, and above all there may be a chancre-like lesion on the glans penis, the *chancre scabétique* of the French authors. Furthermore, practical dermatologists know that the mistake, between these two diseases, actually does occur. It is true that it need not, as the diseases are entirely different in their nature, and the symptomatology of each, in all its phases, is well worked out, but this does not alter the clinical fact of immanent confusion.

The tendency to give names is inherent in the human being, and the story of Adam naming the animals is true to life. One of the ways of gauging the interest that an incident or an object excites is the number of names that collect about it. Bloch has shown in the clearest way how prolific this sponsorial activity was, as regards syphilis, during the five years 1495-1500. Furthermore, names at their birth are also frequently vividly descriptive, and of this Bloch has also given us many an example.

Some have suggested that as words are to them only dull, passionless groupings of sounds, each disease should have only one name, serving like a label for a filing-box into which might be dropped all knowledge appertaining. The stream of life, however, is too shifting and swift, and that variant of life called disease, too turbulent and picturesque to be narrowed down to such rigid dimensions.

## PART II—GENITO-URINARY DISEASES

### THE ART OF HEALING.\*

By EDWARD L. KEYES, JR., M. D., Ph. D., of New York.

"When Sidney Smith asked, 'What human plan, device or invention two hundred and seventy years old does not require reconsideration?' he would no doubt have regarded with favor an occasional reconsideration of the theory and practice of medicine and surgery, especially in view of the current belief that their traditions have been kept alive and their rule prescribed in part by authority."

Such are the opening words of a monograph forty-two pages long, published in the Year of Grace, 1878, by Henry J. Bigelow, M. D., Professor of Surgery in Harvard University, and Surgeon to the Massachusetts General Hospital.

In this space the author reviews his experiments and experiences with a new operation termed by him 'litholapaxy'; an operation which is one of the landmarks at the beginning of modern urology, and one of America's earliest contributions to the Art of Healing.

Just a generation ago litholapaxy, or rapid lithotrity with evacuation, was devised. Within that generation is included almost everything that we now think of as urology. Within that generation the "occasional reconsideration of the theory and practice of medicine and surgery" has become formal and annual, and it is by such meetings as this of The American Urological Association that we pass from one to another the burning torch of Science, that we weigh the intelligence and sincerity of our contemporaries, prove the theories of our predecessors, and endeavor to lay a foundation for the progress of the generation to come.

This convention of The American Urological Association is no mere junket. We meet, it is true, with smiling faces and open hands to greet the friends we have not seen for a year past, and the joy of this greeting is indeed a large part of the profit of our annual gathering; for no amount of mellowness is amiss in a physician. But we gather chiefly for the double purpose of announcing our own medical and surgical prowess and of each learning what the other has been doing during the year that has just passed. We watch the clinics for new points in technical detail, we listen to the papers read for new theories.

And right in the midst of this grave frivolity that we call a meeting of The American Urological Association is set down the annual

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\*Presidential Address before The American Urological Association, St. Louis, April 18th, 1916.

address of your President. No one of you, I am sure, who has listened year after year to our successive Presidents, hoping to give you the best that each one of them could provide, will fail to sympathize with the human being who occupies this exalted position. He would like to give you so much and he is likely to succeed in giving you so very very little.

Your past Presidents have covered many fields: some of them historic, some didactic, some social; indeed they seem to have almost exhausted the general topics. I find but one left to me, one which may perhaps be qualified as a ruminative topic, *The Art of Healing*.

It is the fashion nowadays, as doubtless it has always been the fashion, to lament the decadence of our times, and the passing away of that broad-minded generation of medical practitioners whose geniality and wisdom inspired our youthful first struggles towards a comprehension of *The Art of Healing*. The masters of this art, we are told, are dead. We need never again expect to develop that combination of kindness and strength, of geniality and keenness, of breadth and precision, which has marked the great clinicians of other days. In the future we shall all be specialists, more or less monastic attaches of a hospital, or arid accessories to a laboratory. The "occasional reconsideration of the theory and practice of medicine and surgery" which Bigelow was able to dismiss in the first lines of his preface has grown so great as to swallow us up. We are but motes and atoms in the bright sunlight of science, and we may indeed rejoice if, following out the Teutonic method, we are able for but one instant to reflect a single ray of scientific truth into the shadows of ignorance that surround us.

Such might indeed be the impression of an octogenarian physician who wandered into our meeting of this afternoon. To him even our very simple scientific terms might be as meaningless as the traditional turkey tracks. To him our enumeration of renal function tests, complement fixation reactions, and pathological details might seem to denote a devotion to science that quite precludes a human interest in our patients.

Yet for all that we are not real scientists, but only a rather sorry imitation. We have neither the language, nor the training, nor the point of view, nor the occupation that makes the scientific man. We only pretend to revel in the cold, clear light of scientific truth. Actually we are all the while warming our toes before the radiant fires of humanity.

For clinic and laboratory differ as day and night. But like many other human institutions they differ only that they may be complementary. The laboratory is the masculine principle. Its purpose is purely scientific. It collects and tabulates new facts. It draws general deductions therefrom. It advances the knowledge of truth. Such is its purely scientific function.



But let us not unduly exalt the infallibility of the laboratory. A man is no nearer the truth because he bottles it in a test tube or magnifies it through a microscope. The path of scientific progress may be narrow; it certainly is not straight. Slovenliness and vanity are the characteristics of all human thought. Scientist and clinician alike suffer the fatal *kakoethes scribendi*, the itching pen. The contemplation of the children of our minds so fills us with paternal pride that sometimes we even forget they are adopted waifs.

Thus the advance of science laps at the sands of eternity with pulsing waves that seem futilely enough to run up and down the beach. Some crash over with a loud roar and a beautiful display of foam, though these are often soon spent; others slip silently and swiftly out from the ocean of the general scientific consciousness, as it were, and these go surprisingly far. And all the while, quite imperceptibly, this tide of general scientific consciousness is rising, conquering the shore.

Such is Science, our masculine principle.

The Art of Healing, the feminine principle, has an altogether different atmosphere. The clinician gazes at no truth naked in a test tube. His truth is veiled by Life. His *corpus vile* is not a healthy dog but a sick man; not an animal whose resistance to poison can be measured by kilograms but a person whose soul kindles with fear and with hope. He must support where he cannot succour, help where he cannot heal. The scientist has but to combat the ignorance that is in himself. The clinician wars with the active aggressive ignorance of his patient and his patient's friends. The tactics of scientific warfare command attack where the enemy is weakest. The tactics of the clinic require that a certain position shall be held at whatever cost. The clinician marshals his pitiful army of knowledge, fortifies it with what scientific evidence he can command, and then proceeds with the feminine art of diplomacy, with tact, with encouragement, with placebo, with all the tactics of the fair sex.

Do not therefore despise The Art of Healing. It is an ungrateful task to defend woman "in our hours of ease." Yet Art is the mother of Science just as wit is the mother of invention. And in our profession Art is the Helpmate of Science. The two cannot live apart.

The true scientist has retired from the real struggle of life into a monastic contemplation of eternal truth. He may scoff if he will at the more material, romantic art of the practitioner. He does make the world advance. But he does not make it go 'round. Yet is he nobler far than the public prostitutes of our profession, those artists of unhealing, who repose in the arms of dear old *vis medicatrix naturæ*, whose therapeutics are as theatrical as their pathology is pathetic, who fight for and obtain their dole, the daily dollar.

But somewhere between the convent and the gutter there is a *via media*. Somewhere between the asceticism of the chosen and the degradation of the outcast there is a happy marital state where most of us may dwell, where Science of Medicine weds to Art of Healing in a holy bond. Here you will see the scientist come forth from his cell to gaze at the living things in the hospital ward. Here you will find the practitioner humbly confessing his sins to the priesthood of science; science humanized by the touch of art, art sobered by the strength of science.

And we specialists: what is our place in this happy scheme of things? The artist would disown us no less enthusiastically than the scientist does. For there is indeed little physical beauty in most of the situations we encounter or in the work that we perform. Perhaps it were wiser and more humble to speak of our Craft rather than our Art of Healing. But the word Craft has certain suggestions in it which we must hasten to repudiate. Perhaps our only safety lies in calling ourselves Specialists. That term, at least, no one envies us.

But are we altogether specialists? Do we inherit nothing from the famous general practitioner of times past? Have we lost the affection of the community without altogether gaining its respect? Is our tenderness all gone in the acquisition of a little instrumental dexterity and half science? I think not. We are all human. Even the most scientific of scientists cannot shed the last vestige of his humanity. And so long as we remain human there will arise among us, from time to time, great, humble, devoted, studious, clear-minded souls—poets I had almost said—interpreters of science rather than scientists, great instructors of young medical students in the mysteries of life as much as in the mysteries of medicine, great exponents of humanity itself.

For medical science is vivified by its close touch with the living patient, and we are the messengers, the angels (if you will permit me to use the word in its etymological sense) that constantly pass from clinic to laboratory and from laboratory to clinic, deriving theories and inspiration from our contact with the clinical world, and bringing back to that world, not only material help and health, but also spiritual hope and uplift in the hopeless battle against death.

What life indeed so full as ours? Our laboratory and hospital experience combined with the current medical literature pour into our eyes and ears an accumulation of modern observations and deductions from ancient facts and theories sufficient in number and complexity to overwhelm the brain. On every hand the cry of suffering humanity makes our world one vast battlefield full of appealing wounded. Our hearts are overtaxed as much as our poor feeble heads. But that is life! Not accomplishment; not finality

—for that is death! Life is progress and struggle; and the more complex and hopeless the struggle, the more imperceptible the progress, the fuller the life. We live in heart as well as in head, we live in hand as well as in mind. We have use for every muscle, for every sense, just as we have use for every sympathy and every intelligence. Truly The Art of Healing is as broad and as deep as life itself. Denied as we may be by the pure artist and by the pure scientist, we craftsmen shall craftily continue to study our science and to practice our art. We specialists shall continue to help humanity as best we may. We soldiers in the battle against death shall recognize that defeat is our portion, that we can never win, we can never cure the sickness which is called Life. But we can and shall fight our battles, not only by curing those we can cure, but by helping those who are beyond our curing. The Faith of the people we shall humbly try to merit. In return we shall give Hope as well as health, and for ourselves we shall perhaps gain a little flavor of the greatest of these, which is Charity.

And shall the future then see no great exponent of The Art of Healing? Shall this art be poisoned in the laboratory and dried up by specialism? Nay, revisit this earth in spirit a thousand years from now and you will find the great medical practitioner in laboratory, hospital and hovel, restraining the vicious, inspiring the hopeless, strengthening the weak, beautiful in the fulness of his ignorance, his sympathy, his humility, his dexterity, his share in every heartbeat of that humanity which lives and suffers and dies under his hands.



## URETERAL CALCULI: THEIR DIAGNOSIS AND TREATMENT.

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By H. W. E. WALTHER, M. D., of New Orleans,

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Primary calculus of the ureter is an exceedingly rare occurrence. It is possible for a calculus to form in this structure above a stricture or upon an ulcer; in a pouch formed by the mucosal lining of the ureter; or upon a foreign body in the ureter. Boyer reports a case in which a pin in the ureter became encrusted with salts giving rise to a calculus. Walker relates a case in which two ureteral calculi were passed, the nuclei being silk sutures which had been previously put into the ureter during a uretero-lithotomy.

Stones in the urinary tract commonly originate in the calyces of the kidney where they may remain or pass on to the renal pelvis, at times totally obstructing the urinary outflow, and if obstruction continues, producing a hydronephrosis or a pyonephrosis. Should the calculus, however, pass out of the kidney pelvis and lodge somewhere in the ureter, the stone is then designated a 'ureteral calculus.'

The three main points of constriction in the ureter due to physiological narrowing occur: (1) At a point about 1 to 2 cm. below the uretero-pelvic juncture; (2) where the ureter crosses the iliac vessels at the brim of the bony pelvis; and (3) where the ureter enters the bladder wall—the uretero-vesical juncture. Besides these normal constrictions, previous attacks of ureteritis causing an edematous swelling of the lining mucous membrane or a kink in the ureter favors arrestation of a stone.

It has been repeatedly observed that calculi impacted in the ureter may remain there over an indefinite period of time without giving rise to any symptoms whatever. This is particularly true in cases where the stone is found located in a pouch or pocket in the ureteral lining and which produces very little or no obstruction to the outflow of urine from the kidney drained by the ureter in question.

According to most carefully compiled statistics, males are affected with ureteral calculus as often as females. Regarding age, stones are seen most frequently between the second and fourth decades of life. Urinary calculi appear to be rare in the negro

race. I have seen urinary stone but once in the negro, in this instance the calculus was in the bladder.

It is undoubtedly true that certain localities favor stone formation. For example, we who labor in the southern portion of the United States see probably more cases of urinary calculus, according to statistics, than all the other sections of this country combined. The reason for this preponderance of stone in the South has never been explained. The determining factors in the causation of stone formation is too broad a subject to be considered within the confines of this paper. The starting point or nucleus of a calculus is commonly believed to be either a clump of bacteria, a shred or a blood-clot.

In 90 per cent. of cases these calculi are found singly. Multiple stones are occasionally met with, one report stating that 47 calculi were removed from a single ureter. In 3.6 per cent. ureteral calculi are found bilateral. In shape these stones are usually ovoid, resembling seeds of an olive or a date, although coffee-bean and round forms are occasionally seen. The surface of the calculus may be smooth and polished or granular, covered with bosses and frequently they are seen with surfaces spiculated with sharp crystals. This latter variety are usually the least favorable to spontaneous passage unaided and surgical, or at least intravesical, interference must be resorted to.

In the diagnosis of ureteral calculi a number of factors must be considered, each playing an important rôle in arriving at definite conclusions. They are: (a) case history; (b) physical examination; (c) urine examination; (d) x-ray examination; and (e) cystoscopy and ureteral catheterization. These five factors conjointly have so important a bearing on the attainment of a correct diagnosis that each will be elaborated upon sufficiently, giving it the attention it deserves.

*Case History.*—Among the essentials to be obtained from the patient by means of interrogations, one should inquire into the past ailments, paying special attention to previous infections, general or local. A note should be made as to whether or not the patient has ever passed blood, sand or gravel. The question as to pain should be gone into fully. The commonest symptoms complained of by the patient are *pain* somewhere along the tract of the ureter or in the kidney; *hematuria*, which may be macroscopic or only microscopic; and *bladder irritability*. To this triad must be added *anuria*, though fortunately this fourth symptom is not near so common as the first three mentioned.

Young states that ureteral calculi can give rise to five different sets of symptoms and has classified them as follow:—

1. *Renal*—due to obstruction of the ureter;

2. *Vesical*—due to presence of calculus in vesical wall or projecting into vesical cavity;
3. *Seminal*—due to intimate relationship between seminal vesical and the lower end of the ureter;
4. *Rectal*—owing to proximity of rectum to lower end of the ureter; and,
5. *Testicular*—due to proximity of vas deferens as it winds around the juxtavesical portion of the ureter.

If the stone produces complete obstruction of the ureter and especially if this obstruction be in the upper part of the ureter, pain will be experienced in the kidney pelvis, sometimes radiating to the penis, but is not associated with increased frequency of urination, nor is there pain in the rectum nor on ejaculation. In this type of case intermittent renal colic is experienced and perhaps pain in the testis, though the latter is not constantly present.

In those cases where the calculus has passed below the brim of the bony pelvis and then becomes impacted, Young states that these stones are most likely to lodge either: (1) just above the bladder (*juxtavesical* portion of the ureter); (2) within the course of the ureter in the bladder wall (*intramural*); or (3) at the orifice of the ureter where it may project into the bladder cavity (*intravesical*).

According to Young, in intramural stone, when not projecting into the bladder, there may or may not be frequency of urination, but there is always a pain radiating into the penis at the end of urination and there is generally some ejaculatory disturbance, either nocturnal emissions or pain during ejaculation. Pain in the rectum may also occur in this type of stone.

Hematuria may be present to such a degree that the urine appears frankly blood-red to the eye; again in other instances, as is frequently observed, the red blood-cells are only detectable after centrifugalization of the urine and examination of the sediment under the microscope. Much has been written recently on the large percentage of cases in which no blood whatever was demonstrated in positive cases of stone. I shall take up this point at length under the heading of urine examination.

*Physical Examination.*—Studies of the temperature, pulse, respiration, blood-pressure and the blood-count often furnish valuable aid in the correlation of evidences leading to a diagnosis of ureteral calculus. In acute pyonephrosis due to calculus obstruction there is always high fever, chills and sweats. A Widal supplemented by a stained blood smear for malarial plasmodia will frequently differentiate these latter febrile states from an acute kidney or ureteral condition.

It is, however, by means of abdominal palpation that most valuable information will be gleaned in the general examination of the



patient. With the patient lying on his back, at complete relaxation, the kidney and ureteral regions are palpated principally for tumor and tenderness. If the patient be thin the calculus itself may be felt, and if impossible to feel it, at least upon pressure pain will be elicited over the calculus impaction. Where we are dealing with a calculus obstruction, the kidney or ureter may be enlarged due to the urinary retention. Rigidity of the abdominal muscles over the affected ureter is often noted. The palpation of the ureter is most valuable when carried out by the use of both hands, one on the abdomen making gentle but firm pressure downwards while the other hand is placed under the patient in the lumbar region and an effort is made to lift up the structures to be palpated, bringing them closer to the examiner's hand on the abdomen. Calculi in the ureterovesical portion of the ureter can oftentimes be palpated by making a bimanual vaginal examination in the female, while in the male the palpating finger is introduced into the rectum and the other hand placed on the suprapubic region. In order to feel definitely per vaginam or rectum, the stone should be at least a centimeter in diameter and should be situated within or immediately adjacent to the wall of the bladder.

Forceful percussion over the kidney areas (posteriorly), spoken of as 'hammer percussion,' is of value when this maneuver produces pain. The method should be practised with the hand bent to a right angle and held rigid. The position of the patient should be standing with the trunk bent forward and the arms crossed over the chest. Quick blows, with the tips of the fingers, are dealt to the kidney and upper ureter region. The two lumbar regions are struck alternatively. No change is noted over the healthy loin, but on the affected side, as the blow is dealt, the patient will complain of a sharp pain in the affected part, at times lancinating in character.

*Urine Examination.*—The examination of the urine, when done by a trained urologist, is of inestimable value in the diagnosis of calculus in the ureter. Only too few cystoscopists do their own microscopic work. At best, a routine laboratory report on a urine is but a poor substitute for a personal study, and its value must be appraised accordingly.

In my experience it is rare to find a complete absence of red blood-cells in the urine, upon *careful* microscopic examination, when ureteral stone is present. Therefore I cannot agree with some of the more recent writers on this subject when they state that blood is totally absent in many of these cases and that when present is of little value. We know that blood is not a normal constituent of the urine. Therefore, while the finding of microscopic blood may be no positive proof that ureteral calculus is present, the complete absence of this element, upon repeated examinations, is very strong presumptive evidence of the absence of stone in the ureter. Pus,

epithelium, crystals and bacteria complete the microscopic picture. Infected urines will be encountered in about 70 per cent. of cases, and while the *B. coli communis* is the commonest organism found, various pyogenic cocci, the *B. proteus vulgaris*, *B. pyocyaneus*, *B. typhosus* and occasionally the *B. tuberculosis* will be met with. Naturally when blood and pus are found in the urine, albumin in varying amounts will be present.

*X-Ray Examination.*—In definitely localizing a stone and also for the purpose of confirming the diagnosis of ureteral calculus, roentgenography is a valuable adjunct. We know that the rays have their limitations. Conservative radiologists state that only about 65 per cent. of stones in the ureter can be demonstrated in the radiogram. The *position* and *size* of the stone play an important part in the determination of results, and it is probable that the vast majority of failures to get stone shadows depend more upon these two factors than any others. If a calculus is suspected in the upper part of the ureter, the outline of the stone may easily be lost or go unrecognized should the stone shadow overlap one of the transverse processes of the vertebræ. If the stone is suspected below the brim of the bony pelvis (where 75 per cent. are found), either overlying one of the iliac bones or the sacrum, it is easy to understand that at times a stone shadow will be missed. The suggestion of Cabot, to place an Edebohls bag under the lumbar vertebræ so as to give obliquity to the lumbar spine while radiographing for stone in the lower ureter, should be more universally practised. Very small stones, no matter where located, merely because of their size, are apt to escape detection.

Extra-ureteral shadows, such as those caused by phleboliths, calcified glands, etc., may unfortunately lead one astray and must always be borne in mind. However, by the use of the radiographic ureteral catheter or by ureterography, and the making of stereoscopic roentgenograms, these extra-ureteral shadows can be differentiated from shadows within the ureter.

A certain proportion of calculi will fail to cast a shadow no matter with what care the *x-ray* work is performed. The chemical composition of the stone seems to play no part in the matter. At one time it was believed that pure uric acid stones alone, under certain conditions, would fail to cast shadows to the *x-rays*, but recently Geraghty and Hinman have reported cases of ureteral calculi composed only of the phosphates, carbonates and oxalates of calcium, which failed repeatedly to cast shadows.

The amount of care exercised by the clinician in having the patient carefully prepared previous to the *x-ray* examination often spells the difference between success and failure in obtaining good plates. Finally, where all indications point to ureteral calculus, do not be satisfied with a single set of negative *x-ray* plates. Request

that the plates be repeated, and very often the second roentgenograms will demonstrate the calculus.

*Cystoscopy and Ureteral Catheterization.*—The modern cystoscope and the ureteric catheter are conceded to be the diagnostic agents *par excellence* in recognizing calculi in the ureter. Every case in which red blood-cells are demonstrated in the urine or, if this sign be absent, in which the slightest doubt exists as to the diagnosis, *cystoscopy and ureteral catheterism should be insisted upon*. It is difficult, if not impossible, at times, to differentiate, for example, right-sided ureteral stone colic from appendicitis. The late Maurice H. Richardson devoted an entire article to this very point and emphasized the great importance of employing the cystoscope in differentiating these two conditions before operation.

By means of the cystoscope alone much valuable information may be gained. The study of the ureteral orifices, when the stone is in the lower third of the ureter, has attracted the cystoscopist's attention for some time past. No less an authority than E. Hurry Fenwick, of London, contributed a valuable monograph on this subject, in which he describes graphically the changes which may occur in and around the orifice of a ureter harboring a stone. Occasionally no changes whatever are noted in the orifice, and here one must not be deceived into abandoning further investigation by means of a catheter, etc.

Generally one will observe a swelling or puffiness of the ureteral orifice, accompanied by petechial hemorrhages, and the urine coming from such a ureter may be blood-tinged if the stone is traumatising the ureteral lining, or again no urine whatever may be seen to escape if the calculus is producing total block. As the calculus approaches the vesical orifice of the ureter, bright red punctiform extravasations occur around the orifice; that side of the inter-ureteric bar may be swollen and the mucous membrane assumes a dull red, velvety appearance. With stones just within the ostium a deep red extravasation appears in the ureteric area and frequently marked edema of the orifice is noted; the orifice is lost to view and we have a mass of translucent edema occupying the position of the ureter outlet. A calculus engaging in the orifice, at the bladder, and in plain view, completes the excursion of a ureteral stone in its effort to reach the bladder.

The point as to whether the ureters are patulous or not can be determined by the intramuscular injection of indigo-carmin and then watching the ureteral orifices for its appearance. From a totally occluded ureter no blue color will be observed, even after protracted waiting, while from the normal (unobstructed) side indigo-carmin will appear in about ten minutes after injection.

The *ureteral catheter*, when used through the catheterizing type of cystoscope, may give strong indications of the presence of a



calculus in the ureter by coming in contact with it and being obstructed in its advance upwards. It must be remembered, however, that other factors may influence the progress of the catheter besides stone. The catheter may become caught in a fold of mucous membrane lining the ureter, or it may fail to follow the course of the ureteral lumen because of stiffness or too great a flexibility of the catheter. Then too, a stricture or a kink in the ureter might stop the progress of a catheter.

If bilateral catheterization of the ureters is practised, and this should be the rule, it will be observed that on the normal side (the condition is unilateral in over 95 per cent. of cases) the catheter will go up to the kidney with ease and a normal urine will frequently be obtained containing no red blood-cells or pathogenic elements, while from the calculus side the catheter will be arrested long before it reaches the kidney and many red blood-cells, epithelium, and occasionally pus, bacteria and crystals will be demonstrated at microscopy. Then if the catheter can be manipulated so as to pass the barrier caused by the stone, if obstruction exists one will note, from the rapid flow of urine from the catheter, that hydro-ureter, hydronephrosis, pyonephrosis or any combination of these conditions exists. At this stage, besides collecting separate urines for microscopy, one can do separate kidney functional tests, as the urea determination and a phenolsulphonephthalein reading.

To differentiate ureteral calculus from other obstructions of this structure, mentioned above, two methods at our disposal may be tried. First the passing of a *wax-tipped ureteral catheter or filiform* up to the obstruction, manipulating same at this point and then withdrawing and examining the wax coating on the instrument for scratch-marks. This is best done with the aid of a magnifying glass. The second method is by passing the *phonendophore* or metal-tipped auscultatory ureteral bougie devised by Cunningham, and then listening for grating sounds when the metal tip comes in contact with the obstruction.

When no urine has been seen to issue from the mouth of the ureter after a fair amount of waiting; when no color appears from this ostium after an indigo-carmin injection; and when neither large nor small catheters nor filiforms can be made to pass up, it is justifiable seriously to suspect a calculus obstruction. The confirmation of cystoscopic evidence will only be made possible, however, by the combined employment of all of the five diagnostic methods herein enumerated.

*Treatment.*—Theoretically, a stone, which is sufficiently small to leave the pelvis of the kidney and pass into the ureter, should be spontaneously expelled because the narrowest part of the ureter is its junction with the pelvis. It has been estimated, however,

that only about 75 per cent. of stones which enter the ureter are spontaneously expelled (Geraghty).

The treatment of this condition should be considered under three heads—namely, *expectant*, *intravesical* and *operative*.

When the patient is not suffering to any great extent, when there is no total blockage of the ureter, or when the calculus is believed to be a very small one which may escape spontaneously, the expectant treatment may be given a trial.

The various hygienic, dietetic and medicinal measures advocated to prevent the formation of new calculi, as well as to aid in the passage of those already present, are of doubtful value. The advice of leading an active, outdoor life, the restricting of meats, tea, coffee and alcohol from the dietary and the universal employment of drinking large quantities of water has been part of the expectant regime. To mention but a few of the drugs that have been used: piperazine in 10 gr. doses t. i. d., urotropin 15 gr. every four hours (here urine must be rendered strongly acid to get any effect), and sodium bicarbonate in dram doses t. i. d. The pain of a calculus colic is best relieved either by  $\frac{1}{4}$  gr. morphine or  $\frac{1}{3}$  gr. pantopon hypodermically or by ether inhalations. If calculus is in the lower ureter, massage of this structure by rectum in the male and per vaginam in the female may aid in bringing down the stone. Watson recommends oil of turpentine internally in 5 to 20 minim capsules t. i. d., to aid in lubricating the ureteral mucosa and thereby aiding in the expulsion of the calculus.

It is doubtful whether any of these measures are of any appreciable value. The only cases which should be treated in this fashion are the small stones, that is, those about the size of, or just a little larger than, the ureteral lumen, and then only when the case can be kept under personal supervision.

When we stop to consider that eight out of every ten calculi in the ureter will pass spontaneously, one should not be too hasty about operating. Much can be done with the aid of the cystoscope, especially those of the operating type in combination with the various ureteral instruments recently perfected.

The passage of calculi in the lower ureter can often be materially aided by performing cystoscopy and inserting a catheter within the ureter up to the stone, then by various manipulations of the catheter, dislodge the stone or change its position, thereby making expulsion easier. Frequently a small catheter can be passed above the stone and sterile oil or glycerine can be injected with the hope that lubrication will facilitate passage. The *ureteral probang* inserted into the ureter closed and then opened after it has passed above the stone, when withdrawn in this fashion may bring down the calculus with it.

*Ureteral dilatation* may be attempted in one of several ways. With the ordinary catheterizing cystoscope an attempt may be made to pass the two 6 F. catheters up the affected side, thereby producing dilatation equal to one 12 F. catheter. Recently Macht and Geraghty have recommended an injection of 5 c.cm. of a 2 per cent. solution of papaverine hydrochloride, claiming for this agent the property of lowering the tonus of the smooth muscle fibers of the ureter, thereby producing marked relaxation of the ureteral wall, permitting a stone, otherwise impacted, to pass easily.

With the *operating cystoscope* several means are at our disposal for dilating the ureter. A Garceau ureteral catheter of size 11 F. may be used; the Bransford Lewis ureteral dilator may be tried; or dilatation by means of heat applied to the ureter through the electrical *thermo-catheter* of Geraghty, or the electrical *dilating metal ureteral olives and bougies* of Buerger (the latter producing dilatation up to 16 F.); the walls of the ureter may be so relaxed as to permit a calculus, otherwise removable only by operation, to come down to the ureteral ostium at the bladder. When the calculus engages at the ureteral meatus but cannot escape into the bladder due to the inadequate size of the orifice, the opening can be slit by fulguration, by cutting the orifice with the cystoscopic scissors or punch, and the stone can then be extracted with cystoscopic forceps.

The *operative treatment* divides itself under two main captions: (1) Operations on stones above the pelvic brim; and (2) operations on stones in the pelvic portion of the ureter. Cabot further subdivides this latter class into (a) those lying below the iliac vessels but above the lowest two inches of the ureter; and (b) those in the lowest two inches of the ureter including the portion of the bladder wall.

In the management of ureteral calculi several general principles should be laid down. Free exposure of the ureter is at all times essential if the operator is to work without constraint, and such exposure is usually possible except perhaps in the lowest portion. Compression clamping of the ureter some distance above the contemplated point of incision will often avoid contamination of the wound with a probably infected urine. The incision should never be made over the point of stone impaction when possible, but an inch above this point, because of the inflammatory, and at times ulcerative, changes which have occurred. After having opened the ureter and removed the stone it should be demonstrated, with a probe, that the ureter, both below and above this point, is free of obstruction. Ureteral strictures, when found, must be freely incised and the vertical incision sewed up transversely so as to increase the caliber of ureter at this point. As to the closure of the ureteral wound, opinions are divided. Cabot insists on complete



closure with 00 plain catgut. Many do not suture at all, but simply insert a piece of rubber-tissue drain down to the incision in the ureter and close the abdominal wall by layers. The drain is left in for at least a week.

The choice of the skin incision naturally depends on the location of the stone. The ureter should always be attacked extraperitoneally. For a calculus in the upper third of the ureter the Mayo-Robson oblique muscle-splitting incision is generally satisfactory. For stones below the pelvic brim, an incision, which follows the curve of Poupart's ligament, has been proposed by Charles L. Gibson, and is commendable.

Those stones situated within the lower two inches of the ureter should first be attacked by intravesical means by operative cystoscopy, etc. Should these means fail after repeated trials, and the stone remain impacted within the bladder wall or just above this point, suprapubic cystotomy may be performed and the calculus pushed up the ureter by means of a probe, then to be removed by extraperitoneal ureterotomy or the ureter might first be exposed, a probe inserted, and the calculus shoved into the bladder.

Macheca Building.

## X-RAY EFFICIENCY IN BLADDER DIAGNOSIS.

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To-day it is becoming universally recognized that maximum efficiency is attained through systematic and economic application of scientific knowledge. The great struggle that is now going on, instigated by the natural and immutable law that the fittest shall survive, has placed this fact very forcibly before the individual and organized society. The time is not far distant, therefore, when the laity is going to demand of urology, efficiency based upon the systematic and economic application of scientific principles of medicine.

To illustrate: Though the fact exists that 7 per cent. of all cases that consult the urologist—not for venereal, but for urinary diseases—are to the patients themselves unknown and to the physician clinically unrecognized syphilitics, nevertheless, there is not 5 per cent. of the urologists who apply this knowledge scientifically, economically and systematically by making a complement fixation test for every patient that comes under observation. When this is not done it spells inefficiency, inefficiency that the general profession and the laity ere long are going to recognize.

The laity, moreover, in a comparatively short time is going to push aside the inherited customs and traditions of bygone days and become cognizant that the knowledge any one possesses, even the physician, comes through the ordinary channels of the senses and not as a divine dispensation. They will become aware of the fact admitted by all modern practical and scientific physicians, that in medicine every case seen must be considered as having unknown and serious elements until proofs to the contrary are presented. Therefore, to arrive at an exact and correct diagnosis, it is essential to obtain every bit of evidence possible, then corroborate the truth or fallacy of this evidence. Logically, this can be done only when, as in any other walk of life, we systematically employ all the aids that will increase the acuteness and accuracy of the senses.

Regarding our specialty, the laity will then recognize that the cystoscope no longer constitutes the equipment of the urologist, that an urological equipment is complete when it includes not only the cystoscope, but all the aids to the special senses, as a laboratory in fact, the *x*-ray, etc., since only through such accessories the maximum of accuracy and acuteness of the senses is obtained.

To prove the validity of this contention, I have selected as an ex-

ample evidence obtained through applying systematically the *x*-ray in bladder diagnosis. The evidence will be classified under three heads:—

1. That the *x*-ray as a diagnostic instrument elucidates and gives accurate diagnoses that otherwise would remain obscure, even when the cystoscope is employed by competent observers.

2. That the *x*-ray furnishes corroborative evidence of indispensable value.

3. That the systematic employment of any instrument of precision, here the *x*-ray, increases efficiency (*a*) by demonstrating economic methods of application; (*b*) by enabling one to accumulate and so systematize and classify the knowledge obtained as to make it practical rather than theoretical.

#### THE X-RAY AS A DIAGNOSTIC INSTRUMENT.

CASE I.—B-304, male, *æt.* thirty-two. Complement fixation test for syphilis and gonorrhea negative. Urinary examination, negative. Symptoms, those of prostatic enlargement. Clinical and instrumental examination of urethra and prostate showed no abnormality. Patient was examined cystoscopically by experienced urologists of San Francisco, and Portland, Oregon. No diagnosis. Personal cystoscopy. Picture: Bladder uniformly trabeculated; no other pathological phenomena. Likewise, no diagnosis. Radiography with silver iodide, 2 per cent., the diagnosis patent. Fig. 1.—A congenital sacculation (*a*) connected by a neck (*b*) to the bladder. The explanation of the inefficiency of cystoscopy was simple. As soon as sufficient fluid was injected into the bladder, the sacculation was filled, the neck became elongated and contracted, the pulling upon the opening into the bladder closed same and the cystoscope showed merely a uniformly trabeculated bladder.

CASE II.—R-61, male, *æt.* thirty-eight. Complement fixation test for gonorrhea and syphilis negative. Urinary examination: Pus, blood, tubercle bacilli. Bladder too contracted and inflamed for ureteral catheterization even under anesthesia. Right kidney distinctly palpable, enlarged and tender. Great general debility. Right kidney removed, patient's health greatly improved. Cystoscopy three months later. Left ureter catheterized, ureteral specimen showed pus and T. B. Natural conclusion: Prognosis grave, as left kidney was infected, yet patient continued to improve and is well to-day, no T. B. in urine. Fig. 2.—The *x*-ray evidence—a contracted bladder, therefore a contraction of that portion of the ureter passing through the bladder wall. Result: A patent but small ureteric opening, ureter dilated at the distal, or bladder end, and containing T. B. and pus from bladder. At the proximal end, ureter normal and connected with a healthy kidney. In this instance the cystoscopic evidence gave rise to a false conception.

CASE III.—M-422, male, *æt.* thirty-six. Complement fixation test for gonorrhea and syphilis negative. A case of extensive perirectal and periurethral abscess, chronic, four years duration, following stricture of urethra. Two prior operations. Fig. 3.—Perineal scars showing extent of abscess infiltration. Urine contained pus, necrotic tissue, various micro-organisms, as staphylococci, colon bacilli, etc. Symptoms: Frequency of urination, one-half to one hour, and pain on urination. Systemic evidence of chronic sepsis, incapacity for work. Fig. 4.—A post-operative radiograph, after third operation, showing still an extensive blind fistula (*a*) between the bladder and rectum and com-



*Peterkin: X-Ray in Bladder Diagnosis*

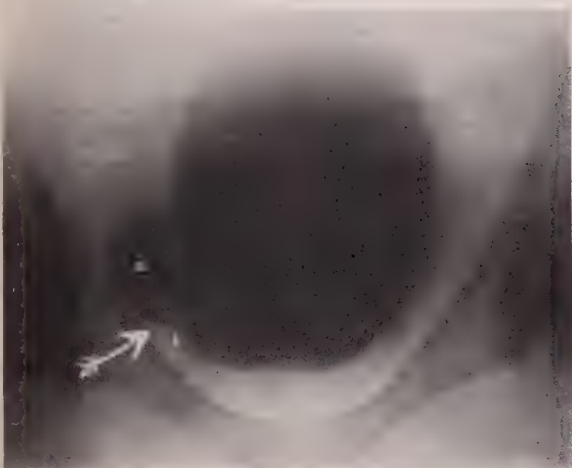


Fig. 1.

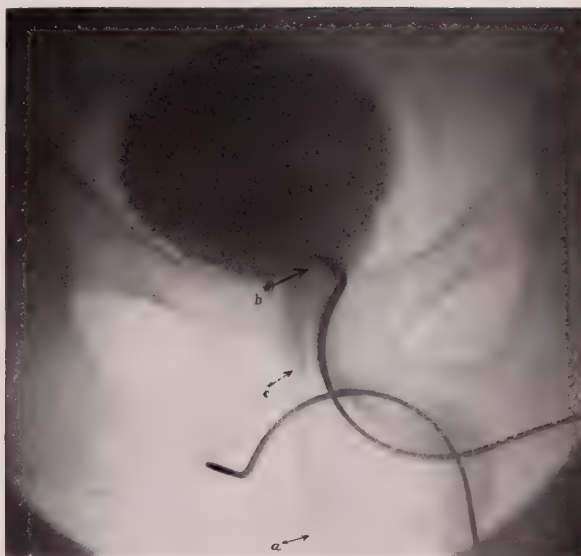


Fig. 4.



Fig. 6.



Fig. 5.

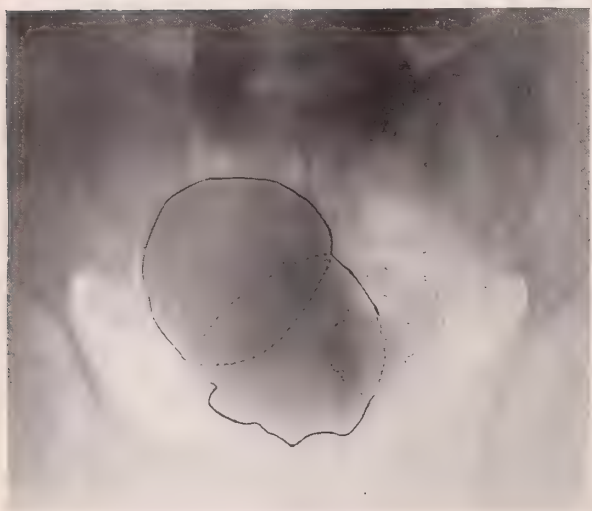


Fig. 7.



Fig. 10.

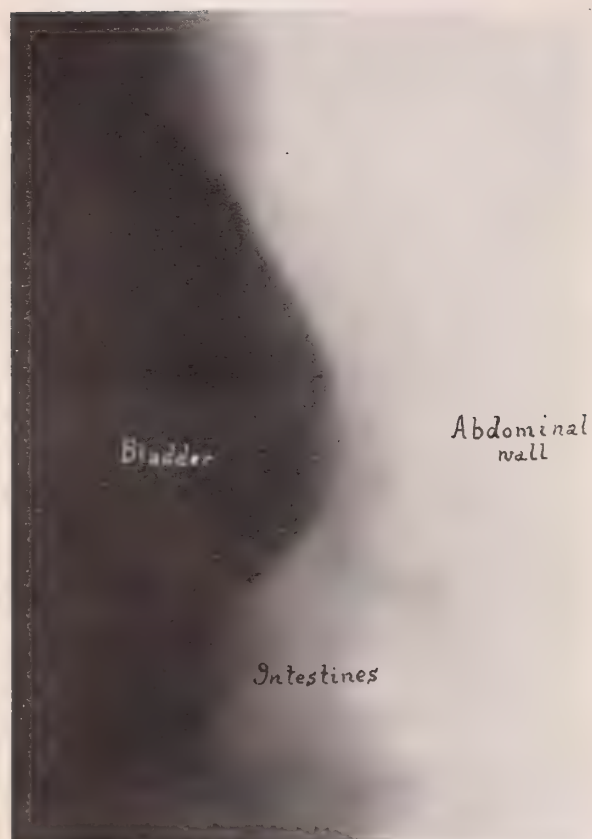


Fig. 14.

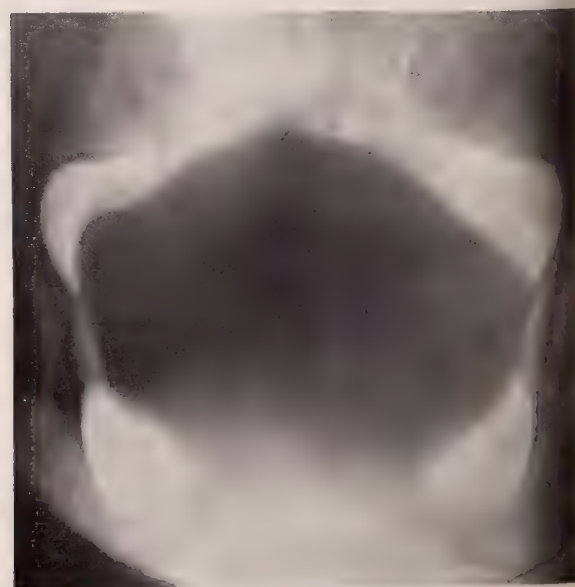


Fig. 12.

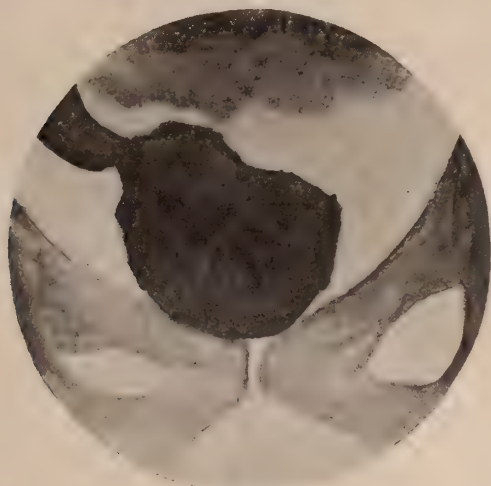


Fig. 2.

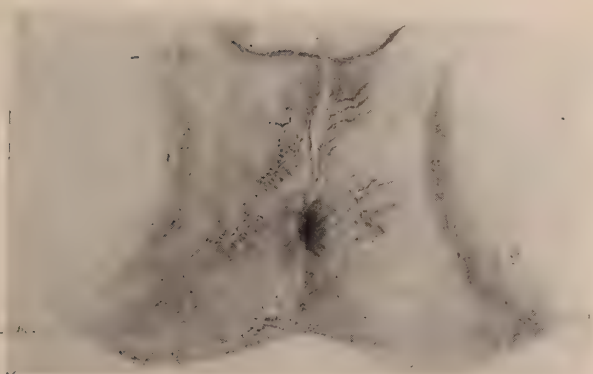


Fig. 3.

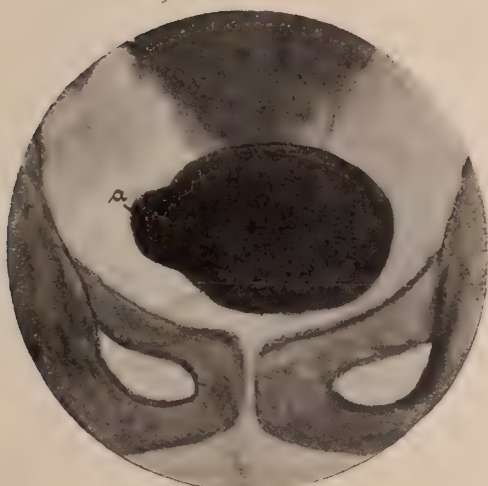


Fig. 8.



plete destruction of internal sphincter (b) of the bladder, likewise the external sphincter (c), therefore the impossibility of restoring urinary control by operative procedure and that the end result must be permanent incontinency.

Fig. 5.—A radiograph of a normal bladder, presented for comparison. (1) Zipser's urethral clamp to hold silver iodide in urethra; (2) internal sphincter, which shows complete performance of sphincteric action, demonstrated by distinct line of demarcation between the bladder and the silver iodide in urethra; (3) the external sphincter, performing only part of its function, due to distention of urethra by the radiographic fluid.

CASE IV.—S-429, male, *æt.* sixty-six. Complement fixation test for gonorrhea and syphilis negative. Urinary examination: Extensive amount of pus, blood and micro-organisms of various kinds, due to hemorrhage and contraction of posterior urethra; cystoscopy practically negative. X-ray (Fig. 6), however, demonstrated (1) sacculation of bladder; (2) calcareous prostate; (3) complete destruction of bladder sphincter; (4) complete assumption of urinary control by the external sphincter, as demonstrated by the dark line where the silver iodide has been forced out by the contraction of this muscle from the posterior urethra into the bulb.

In the two preceding cases, III and IV, the *x*-ray gives us evidence as to the functional activity of the urinary sphincters, knowledge that the cystoscope cannot impart.

CASE V.—S-416, male, *æt.* sixty-three. Complement fixation test for syphilis and gonorrhea negative. Urinary examination: Microbic infection of various kinds, staphylococci, streptococci, colon bacilli, pus, etc. Symptoms: Frequency of urination, every half to one hour day and night for last two years. Bladder contracted, capacity two and one-half ounces; cystoscopy negative. Radiograph (Fig. 7) shows multiple sacculations of the bladder, so numerous and large that the fallacy of operative procedure is self-evident. Extraneous to the subject at hand, but of practical interest are the results of treatment. Treatment instituted: Rest in bed, Sitz baths, light diet, sandalwood oil, frequent irrigation, consumption of large amount of fluid for two weeks. Later self-irrigation under hydrostatic pressure. Urine is now negative as to infection; patient to-day holds his urine four to five hours and considers himself entirely well, though radiograph of bladder shows sacculations present, but diminished in size.

In view of the evidence presented in these 5 cases, but one conclusion can be drawn: That the *x*-ray will give positive evidence in many instances in which the cystoscopic evidence will not only be negative, but sometimes misleading, as in Case II.

#### THE VALUE OF CORROBORATIVE EVIDENCE.

CASE I.—K-138, female, *æt.* forty-four. Complement fixation test for syphilis and gonorrhea negative. Prior operation: Suspension of uterus and perineal repair, with object of overcoming cystocele, regarded as causative factor in continuance of chronic cystitis. Operative results: Cystitis slightly improved, but colon bacilli and pus still continued in bladder. Cystoscopic diagnosis: Sacculation of right side of bladder, result of straining and overdistention prior to operation. Urine still retained in this sacculation, therefore a constant focus of infection remains. The corroborative *x*-ray evidence, Fig. 8-a. Fig. 9.—A similar pathologic process as viewed from the front, post-mortem specimen.

CASE II.—D-194, female, æt. fifty-five. Complement fixation test for syphilis and gonorrhea negative. Symptoms, varied, so that the diagnosis ranged from gall-stones, appendicitis, and renal calculi, to movable kidney. Pyelographic picture of kidney (Fig. 10) shows a slightly distended pelvis, partial flexing of kidney on itself, as illustrated by the calix overshadowing the pelvis (a).

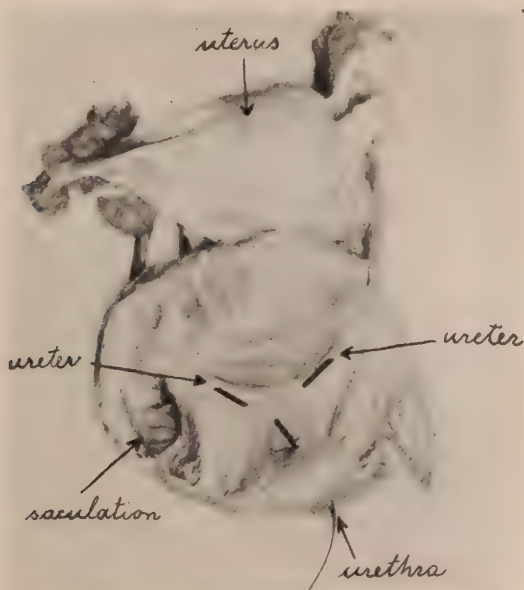


Fig. 9.



Fig. 11.

Fig. 11 shows position of this kidney, patient standing, that it has descended from its normal location to the crest of the ilium. Prolapse of pelvic organs, pronounced cystocele, as ascertained by palpation and cystoscopy, considered a mechanical factor that would render fixation of kidney a failure unless the

prolapse and cystocele were remedied. Patient informed that pelvic operation was as essential to recovery as fixation of kidney. Corroborative evidence (Fig. 12) shows this organ, the bladder, when distended, displaced well below the symphysis pubis. Normally it should be above same.

CASE III.—T-132, male, *æt.* forty-eight. Complement fixation test for gonorrhea and syphilis negative. Prostatectomy, recovery with lack of force to stream, and continuance of pus and micro-organisms in bladder, irrespective of continued post-operative treatment. Cystoscopy showed sacculcation of upper wall of bladder, diagnosis corroborated by the x-ray (Fig. 13-a).

CASE IV.—A-105, male, *æt.* fifty-six. Complement fixation test for gonorrhea and syphilis negative. Prostatectomy. Corroborative evidence (Fig. 14) that a bladder suspended to the abdominal wall stays in place. Radiograph taken six months after operation.

*Value of Corroborative Evidence.*—1. Corroborative evidence makes positive evidence. Positive evidence admits of accurate diagnoses that place medicine in the realms of exact science.



Fig. 13.

2. Corroborative evidence that is capable of ocular demonstration precludes doubt in the mind of the patient and obviates the use of oral evidence that often consumes so much valuable time and seldom convinces.

#### INCREASED EFFICIENCY, DUE TO EMPLOYMENT OF X-RAY SYSTEMATICALLY.

Results in: (A) Economy in application.

(B) Systematizing and classifying radiographic evidence.

##### A. ECONOMY IN APPLICATION.

1. Through ascertaining factors such as position of patient, which will increase the accuracy and exactness of the picture, therefore diminish the number of plates necessary and time consumed in taking them. Fig. 15 shows the position usually advocated in radiography of the bladder. Fig. 16 shows position recommended, as it reduces the number of plates used through—the patient on ab-



domen, bladder and its contents are nearer radiographic plate; the reversed Trendelenberg removes pressure of abdominal organs and permits bladder to rise well above pelvic brim; the position of tube against glutei muscles, at an angle of  $65^{\circ}$ , prevents interference of shadows of the pelvic bones with that of the bladder.

In enlargement of the prostate, sacculations of the bladder, etc.,

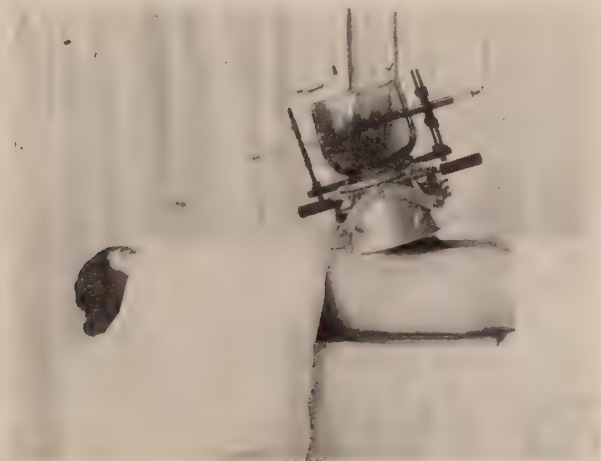


Fig. 15.



Fig. 16.

the bladder being filled, calculi and foreign bodies will gravitate toward the anterior wall of the bladder and thus come nearer the plate. The value of this position, when stones or foreign bodies are small and of a composition non-resistant to the *x*-ray, or when it is desired to determine the position, shape, outline and deformities of the bladder, is self-evident.

2. Through substituting inexpensive for expensive mediums, as

(a) air for oxygen when a medium of low specific gravity is desired; (b) silver iodide for the albuminate of silver when a medium of high specific gravity is required. In the latter instance, economy arises through (1) diminished cost of drug; (2) saving of laundry due to absence of stain; (3) economy of time in removing salt stains from patient, linen and equipment.

Five hundred cubic centimeters of a 5 per cent. solution of silver iodide, the amount necessary to fill the average bladder, costs \$1.50. Diluted to 2 per cent. by sterile water, it will give good pictures in thin patients. However, reesterilization of this and of the 5 per cent. solution under steam pressure for thirty minutes enables the same solution to be used four or five times, thus further reducing the cost of the drug from \$1.50 to 30c per patient.

Many other factors that reduce the cost of material and time consumed could be presented, but are not within the province of this paper.

#### B. SYSTEMATIZING AND CLASSIFYING RADIOGRAPHIC EVIDENCE.

This enables us to state, for instance, the practical advantages of *x*-ray in bladder diagnoses, which to date are as follow:—

1. The obtaining of evidence of pathological phenomena often unsuspected and otherwise undemonstrable.

2. That mediums of low specific gravity, as air or oxygen, when the bladder is well distended, will give radiographic evidence of small and otherwise undemonstrable foreign bodies in the bladder, and sometimes of tumors, especially when employed with abdominal position advised.

3. That mediums of high specific gravity, as silver iodide, give evidence as to position, form, size, capacity of the bladder and the presence of abnormalities, as sacculations, etc. For instance, bladder filled with silver iodide will give outline and size of large bladder tumors. Bladder filled, then emptied of silver iodide, will often show size of ulcerations and small irregular growths, as papillomata, due to the iodide adhering to the rough surface. In females it will demonstrate the presence of bladder adhesions, and the pressure on same of tumors and other abdominal organs external to the bladder.

The bladder filled with silver iodide will give position of bladder in hernia operations, especially in children. In women with pelvic ptosis, it will demonstrate not only the presence of cystocele, but also the amount of residual urine, etc.

4. The *x*-ray will give exact data as to the size and number of calculi; information as to the nucleus of stone, if a foreign body—a factor which if not known might complicate removal; presence of calculi behind prostate and in sacculations, in the mouth of the ureter or in that portion of the ureter which runs through the bladder

wall—positions in which they could not be localized either by sound or cystoscope.

5. In cases of hemorrhage, pronounced inflammation, diminished bladder capacity, etc., conditions which obscure the cystoscopic view, radiography will often give very useful information; especially is this true in stricture, prostatic hypertrophy, etc. In my practice it is the rule that radiographs be taken in cases of prostatic hypertrophy, not only prior to operation, but subsequent thereto, in order to ascertain the effect of operation in correcting pathological conditions, especially the mechanical ones of general trabeculation of bladder, sacculation, etc.

6. A series of *x*-ray pictures gives positive demonstrable evidence as to the progress of disease, effects of operation, etc., which is a cystoscopic impossibility.

Fifteen years of applying this principle—that efficiency is the systematic and economic application of the scientific principles of medicine to one's daily work—has convinced me that every scientific urologist must ultimately adopt this theory of action and organize his work, so as to include all the aids to the special senses and their economic employment. As an example of the practical value of so doing, these few examples of what the *x*-ray has accomplished for myself are submitted.

NOTE.—Figures 2, 8, 11 and 13 are drawings from *x*-ray plates, since the plates, while easily interpreted, would not make good photographic prints.



## SEMINAL VESICULITIS.

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The seminal vesicle has the center of the genito-urinary stage at the present time. It seems that all who are specializing in the surgery of the urogenital tract are paying more attention to this part of the tract than any other. There is no doubt that the time is ripe for this to be true, for it has come upon the profession gradually that little has been known of the pathology of these organs and still less concerning their treatment.

The profession as a whole, including both the urologist and the general practitioner, have been massaging the vesicles, dilating the deep urethra, followed by irrigations, deep instillations and local applications to the prostatic urethra for years, with a vast percentage of cases that have never been cured. These cases have gone from surgeon to surgeon, from dispensary to dispensary with variable results, and have finally given up all hope of ever getting well, becoming walking carriers of infection, infecting all with whom they cohabit. There is no doubt that many a case has been massaged from the street to the dispensary, from the dispensary to the private office, from the private office to the hospital, from the hospital to chronic invalidism.

The specialist has begun to recognize the fallacies in the routine form of treatment and by careful experimentation and observation has arrived, after years of labor, at the logical estimation that a fair percentage of cases of seminal vesiculitis are surgical from the onset or become surgical as the condition develops chronicity.

Through these studies we have become more familiar with the anatomical relations of these organs and thereby more accurate has been the development of the surgical technique.

It will be well to remember that the seminal vesicles are located between the urinary bladder and the rectum, posterior to the prostate and external to the vasa deferentia. They are widest at the upper ends where they measure approximately 1.3 cm. and are quite narrow at their convergent ends, where they join the vasa deferentia opposite the base of the prostate. They average about 6.4 cm. in length and about 0.6 cm. in thickness. They are very irregular in size and outline and even differing considerably on the two sides in the same individual.

Posteriorly they rest upon the rectovesical fascia and the rectum. To the inner side of each vesicle is the lower enlarged convoluted end of the vas deferens. The triangular area of the bladder located between the divergent vasa deferentia and seminal vesicles rests upon the rectum and corresponds with the trigonum vesicæ. The seminal vesicles are covered by a fibrous sheath which is derived from the recto-vesical fascia and contains some involuntary muscle tissue.<sup>1</sup>

It must not be forgotten that the upper pole of the vesicle is in close proximity to or overlaps the ureter. The vesicles and their ampullæ may be palpated through the rectum, and their position and relation depends to a large extent upon the contents of the bladder, whether there is little or much urine in that viscus.

E. O. Smith<sup>2</sup> calls attention to the anatomical classification of Picker as given in his paper at the fourteenth Internal Medical Congress, 1913, held in London, where he classes them into five groups:—

1. The simple straight tube.
2. Thick-twisted tubes with or without diverticula.
3. Thin-twisted or straight tubes with or without diverticula.
4. Straight or twisted tubes with large grape-like diverticula.
5. Short main tubes with large irregular ramified branches.

I agree with Smith when he comments upon the most important anatomical features, from the clinical and pathological viewpoint, in that the vast majority of vesicles contain multiple sharp angulations, hence the difficulty of emptying this type of vesicle, even in the presence of properly executed massage.<sup>3</sup>

The appearance of the interior of the normal vesicle is that of fine trabeculations, the arrangement being such that it is evident that there must be a very extensive mucous surface with the worst natural drainage.

The vesicles become infected most commonly from an extension of the process from the posterior urethra due to continuity of structure. Since the posterior urethra is so frequently involved in gonorrheal conditions, the gonococcus is the important etiologic factor.

Others forms of bacteria may produce seminal vesiculitis as the condition occurs in individuals who deny all venereal infection.

I have found that vesiculitis occurs in those whose sexual life is not physiological. Excessive indulgence, the use of condoms, and the habit of withdrawing at the time of orgasm must be considered as etiologic features. Practically every case when gonorrhea is denied may be traced to one of the conditions just mentioned.

How the vesicles escape every gonorrheal involvement of the posterior urethra is to be wondered at; the percentage of cases certainly is large, but the diagnosis is usually not made until later, as there may be no acute manifestations of prominence. The acute

phenomena elsewhere call the attention of the physician to other structures of the urogenital tract.

It seems to be the consensus of opinion that the vesicles become infected by direct extension from the posterior urethra through the ejaculatory ducts, yet I am rather inclined to think that the infection may be hematogenous for the reason that there may develop a vesiculitis without extension into the vas or epididymis.

Vesiculitis may be classified as—

1. Acute.
2. Subacute.
3. Chronic.

The symptoms of acute spermatocystitis are not definite, as they are obscured by those produced by acute posterior urethritis. Accompanying the painful pollakiuria there are painful erections, and frequent emissions which are bloody in character. Deep-seated pain occurs in the perineum together with fulness in the rectum which is exaggerated upon defecation. Sacral and suprapubic pain is very common; the latter is intensified by deep palpation. The bladder and rectal fulness is not relieved by defecation or micturition. There may be slight fever, which, however, may be quite high if complications occur.

The acute form fortunately is not of common occurrence and the condition of the vesicle does not develop until later. The subacute form is, however, the type usually first recognized, the symptoms continuing after the posterior urethritis has become more or less acute.

The chronic type is that which concerns both the physician and the patient to the greatest degree. The most prominent symptoms of this condition are chiefly sexual and nervous with a slight increase in frequency of urination, with discomfort in the urethra, the sacral region, the pubic region and occasionally the iliac regions. Frequent painful erections with emission containing pus and blood are common. *Relapsing urethritis is a symptom of importance and if it occurs the seminal vesicles should be well looked into.*

There is another type of symptoms which is commonly overlooked that is more or less constitutional in character, and may be classified as a rheumatoid variety. In this type there is no doubt that many a tonsil has been sacrificed without result where the vesicle is the primary focus.

Fuller<sup>1</sup> and Squire<sup>2</sup> have emphasized this form of the disease very clearly, and this is one of the reasons for the development of the surgical procedure as recommended by Fuller and exemplified by Squire. This condition will be considered more at length under treatment.

The diagnosis of spermatocystitis can only be made from com-



binning the facts gained from the history, the symptoms and careful examination. The vesicles may be palpated through the rectum. I find that the best method for me is to have the patient bend over a chair or the examining table, and with a well-lubricated gloved finger, pass the finger into the rectum and with a counter-pressure over the pubic region, if proper manipulation is made, the vesicles, if they are involved by an inflammatory process, may be palpated. They usually will be exquisitely sensitive in the acute or subacute stage and rather painful in the chronic stage. In the acute stage the vesicles assume a doughy, sausage-shaped swelling which is at the base of the prostate passing upward and outward.

It may be considered a good rule to follow, that if the vesicles cannot be palpated they are not diseased and vice versa; yet this is not invariably true. Vesicular inflammation may not show itself in enlargement of the vesicles. A normal vesicle which is distended can be felt as a soft velvety cushion, usually without discomfort. *Sensitiveness and pain are the diagnostic criteria.*

Occasionally one may find fluctuation due to the accumulation of pus, mucus and seminal secretion; however, abscess formation of these organs is rare.<sup>6</sup>

In the chronic stage the examining finger will find that the walls of the vesicles are tough and thickened, having lost the velvety sensation of the normal tube with usually a considerable amount of tenderness. The examination should preferably be made both with a full and empty bladder, so that one may have a fair conception of the exact sensation to the examination finger at these times.

One must be able to recognize prostatic involvement and must be able to differentiate between them. It must be remembered that frequently the periprostatic structures and perivesical tissue may be involved. It may be difficult, if this is the case, to map out the vesicles.

Examination of the prostate and vesicles in all cases of chronic urethritis is the routine that must be followed for successful diagnosis. Microscopic examination as well as cultures should be made upon the expressed fluid from the vesicles which will give us evidence of much value.

A salient point that must not be cast aside lightly is the fact that right-sided seminal vesiculitis may simulate an appendical attack. *In fact in every case of abdominal pain of an obscure nature the seminal vesicles should be examined and excluded as an etiologic fact before arriving at a definite diagnosis.*

The treatment of seminal vesiculitis may be divided into three forms:—

1. Prophylactic.
2. Palliative.
3. Surgical.

In considering the prophylactic form I must call attention to the improper methods that still exist among general practitioners of treating the acute cases of gonorrhea. The pernicious habit of allowing the acute case to go without local treatment from a week to ten days seems to be the general method of treatment. Even some of the textbooks recommend this method, with the idea of waiting until the acute symptoms have abated.

Practically in every case so treated the posterior urethra becomes involved, and then it is only through the kind indulgence of the most propitious gods that the seminal vesicles escape.

An acute case so treated has as a natural consequence a posterior involvement, which is considered to be the ordinary course of the disease.

*Just as soon as the profession realizes that posterior urethritis is a complication and one to be avoided, then, and only then will proper attention be given acute anterior urethritis.*<sup>7</sup>

It has been my practice for many years to commence active treatment immediately a patient presents himself, the sooner the better.

This treatment consists of hand injections administered by myself and never left to the patient unless the circumstances are peculiarly extraordinary.

Just as soon as the discharges discontinue and there remain no gonococci, with only a few pus shreds in the urine, then a mild astringent irrigation is given the anterior urethra only.

It will be surprising to find the large percentage of cases that will confine themselves to the anterior urethra without complications. Seminal vesiculitis, therefore, may be prevented in a large number of cases by preventing a posterior urethritis in the original case. This is a consummation devoutly to be wished.

The treatment of acute spermatoecystitis consists for the most part in watchful waiting. Massage is contraindicated and the vesicle should only be palpated to confirm the diagnosis.

If the patient is running any temperature, he should be put to bed. The bowels should be emptied, and if pain is persistent, hot rectal douches should be administered, together with suppositories containing morphine and belladonna of each  $\frac{1}{4}$  gr., to be introduced night and morning.<sup>8</sup>

Large amounts of alkaline water should be given, preferably Potasul (Potash Sulphur Water). Walker recommends that all forms of urethral treatment be discontinued. I cannot agree with him upon this feature. I believe if treatment is continued that the dangers of complications, as epididymitis, prostatitis, etc., will be greatly minimized and at the same time the duration of the acute spermatoecystitis will be shortened materially.

Resolution will take place or the inflammation will develop chronicity. The treatment of chronic inflammation, that which I have

classified as palliative, has been the routine used for years, and I must say, greatly abused, consisting principally in vesicle massage. There is no doubt that this form of treatment in many instances is followed by excellent results and permanent cures, provided that massage has been properly performed. I know of no form of treatment that has been so badly done as massage. I have seen physicians rub these organs by the so-called 'milking process' covering a period from five to fifteen minutes at a treatment and doing this as often as every day. Is it any wonder that the patients' condition is exaggerated? It must not be forgotten that the seminal tubes are exceedingly sensitive and delicate structures, and, improperly executed, massage produces irritation, so much so that the inflammatory process is increased rather than benefited; complications such as perivesiculitis, periprostatis, and epididymitis may follow as the result of this treatment. *Too strenuous massage is dangerous.* The pressure made upon the vesicle depends to a great extent upon the type of inflammation and the changes which have taken place; the knowledge of proper massage comes only with long experience. Massage is made for two purposes, to produce drainage and excite normal stimulation by increasing the blood-supply. As the majority of vesicles are of the variety that have the very worst natural drainage, it certainly stands to reason that a fair proportion will not be emptied by massage. In following this form of treatment it usually is not necessary to make much pressure nor should this be prolonged. I find that I can accomplish all that I desire by a stripping process executed by my fore-finger beginning at the upper end by a side to side rolling motion, bringing my finger downward toward the convergent ends, making just sufficient pressure to empty the vesicle. This massage may be accomplished in one minute or less. I do not repeat the process more frequently than twice a week.

It is always wise, following massage, to treat the urethra, as this portion of the tract may be easily reinfected. The chronic cases are treated three times a week. The massage and urethra treatment are given twice; between the two the urethra alone is treated, usually by dilatation, which may be productive of marked benefit. It must not be forgotten that no instrumentation of the urethra should ever be performed without following it by irrigations or injections. This method, with a reasonable degree of certainty, will present untoward phenomena.

The surgical treatment has been devised for the purpose of bringing about a cure of those protracted and obstinate cases that will not respond to palliative measures. Much credit is due Fuller, Belfield, Young, Squire and others, for the development of the technique. The surgical treatment may be divided into vesiculotomy, vesiculectomy and vasostomy.



Fuller<sup>9</sup> has operated upon a large number of patients whom he claims are for the most part permanently cured. He performs a vesiculotomy, approaching the vesicles through a perineal incision and producing drainage by slitting the vesicle through its entire length.

The technique, as recommended by Fuller, is rather difficult, and the incision of the vesicle is done more or less blindly, and in other than Fuller's masterful hand considerable damage might be done. Squire<sup>10</sup> has improved Fuller's technique and has simplified the method materially. The procedure is so managed that the vesicles are directly exposed to vision, so that they may be incised not by sensation of touch, but by actual sight. Drainage is accomplished and remarkable results are reported.

Vesiculotomy is a major operation of considerable magnitude, and unless one is particularly familiar with the anatomical relations of the perineum and vesicles, it should be left to those whose experience is great in this special work.

Squire has given his indications for vesiculotomy as pus, pain and rheumatism, and I might add abnormal sexual phenomena. Vesiculectomy has been recommended by some authorities in certain selected cases, but I cannot conceive of better results being obtained than by vesiculotomy. It must be extremely difficult to determine just when the operation should be performed in preference to drainage. The only field open for vesiculectomy in my opinion is tubercular involvement of the vesicle, and even here the field is exceedingly limited.

Belfield<sup>11</sup> has devised a method by his operation of vasostomy with injection into the vasa, of silver solution with the purpose of bringing medication directly into the vesicles. This method is by far the most simple of all the operative forms of treatment and may be accomplished under local anesthesia, with only the loss of a day or two in the hospital. I can certainly agree with Belfield, Herbst and others that this form of treatment is followed by excellent results. I fear, however, Belfield has made an error in stating that this method is simplicity itself. The technique must be carefully carried out or damage might result. It is necessary to make exceedingly careful dissections, exposing the vas without damaging adjacent structures. The needle of the injecting syringe must be accurately inserted into the calyces of the vas before the injection is made, as the tissue may be distended by the fluid and considerable induration and pain will follow. The results in carefully selected cases are excellent. I have seen improvement almost immediately. It must not be forgotten that the operation of vasostomy must be followed by the palliative measures mentioned above. I can truly say the duration of the disease is materially influenced by this combination of treatment. In conclusion the following points may be reiterated for emphasis.

1. Remember that in all cases of posterior urethritis the vesicles may be involved.
2. Do not forget that a thorough examination is necessary to reach a definite diagnosis.
3. Do not fail to recall the fact that most cases of seminal vesiculitis are infection carriers.
4. Remember that the seminal vesicles may be the primary focus of a constitutional malady. Do not forget that obscure abdominal pain, as well as pain in the back, may originate from the vesicle and that an erroneous diagnosis may be made.
5. Let the fact be prominent that the prophylactic form of treatment is the most important by far; also do not *over-treat* your patient, for considerable damage may follow.
6. Last but not least, remember that surgery is indicated in a certain number of selected cases.

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# THE EFFICIENCY OF DISPENSARY TREATMENT IN CHRONIC INFECTIONS OF THE PROSTATE AND SEMINAL VESICLES.\*

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Desiring to know how satisfactorily the chronic infections of the prostate and vesicles were being treated, we have studied these infections in patients coming to the Out-Patient Department of the Washington University Clinic from December, 1914 to March, 1916. Sanford's results showing the inefficiency in the treatment of gonorrhea in clinic patients really stimulated our study of the chronic infections. The Washington University Dispensary records show 372 cases of prostate and seminal vesicle infections; 72 of these were eliminated on account of insufficient data, leaving 300 complete records. During this period there were admitted into the Urological Clinic 895 new patients, and 11,774 repeaters.

## AGE.

Youngest, 15 years.

Oldest, 67 years.

Age 15-20.....	13 patients, or 4.33 per cent.
Age 21-30.....	125 patients, or 41.67 per cent.
Age 31-40.....	90 patients, or 30.00 per cent.
Age 41-50.....	40 patients, or 13.33 per cent.
Age 51-60.....	23 patients, or 7.67 per cent.
Age 61-70.....	9 patients, or 3.00 per cent.

## ETIOLOGY.

Cause mentioned in 272 of 300 cases, or 90.67 per cent.

Previous gonorrhea .....	201, or 73.9 per cent.
Gonorrhea denied .....	62, or 22.7 per cent.
Sexual excess alone .....	3, or 1 per cent.
Masturbation alone .....	3, or 1 per cent.
Chemical irritation .....	1, or 0.5 per cent.
Gonorrhea and sexual excitement combined.....	1, or 0.5 per cent.
Gonorrhea and masturbation combined.....	1, or 0.5 per cent.

Previous gonorrhea—longest 38 years; shortest 2 months.

An antecedent gonorrhea occurring in about 74 per cent. of the cases is a very small percentage compared to the usual conceptions of gonorrhea as an etiological factor, and we believe that it is in-

\*Read at Barnes Hospital Clinic before the American Urological Association, April, 1916.



accurate because of the fact that many of the patients are foreigners and hard to understand, and many even though asked specifically have unquestionably lied; but a negative answer compelled us to incorporate these patients in the non-gonorrheal column.

#### SYMPTOMS.

1. *Discharge*.—Mentioned in 146 cases, or 48 per cent. of total number of patients { present, 98, or 67 per cent.  
not, 48, or 33 per cent.

The majority had the classical morning drop.

2. *Urinary*.—Mentioned in 259 cases, or 86.3 per cent. of total number of patients { present, 173 cases, or 66.8 per cent.  
not, 86 cases, or 33.2 per cent.

*In Order of Occurrence*.—Frequency, burning, dribbling, urgency, pain, hematuria, hesitancy, retention, difficulty, shreds, irritation.

Urinary symptoms are rather more frequent than those reported by other observers. Frequency and burning were by far the most common symptoms, and were due to posterior urethral and verumontanal involvement in conjunction with the chronic inflammatory processes within the prostate and vesicles. Dribbling was mentioned very frequently, the type of dribbling amounting really to a lack of emptying ability for the last few drops of urine. There was no case of incontinence associated with these unless associated with spinal cord disease.

3. *Sexual*.—Mentioned in 201, or 67 per cent. of series of 300 cases.

Impaired in 98, or 48.75 per cent. of cases mentioned.

Not impaired in 103, or 51.25 per cent.

Premature ejaculation was the most frequent symptom.

4. *Referred*.—Referred pains were mentioned in 203, or 67.66 per cent. of total.

Present in 167, or 82.2 per cent.

Absent in 36, or 17.8 per cent.

*In Order of Frequency of Occurrence*.—Pain or ache in the back (lumbago), in legs and hips (sciatica), suprapubic region, groin, testicle, perineum, scrotum, rectum, penis, urethra, kidney.

It is very interesting to note the high percentage of referred symptoms, the commonest of which are the so-called lumbagos and sciaticas. The large majority of these chronic infections have associated with them, symptoms that are so frequently mistaken for sciatica, sacroiliac disease, spondylitis, etc. We have tried to be very careful in ascribing these to inflammatory conditions in the pelvis, and have worked hand in hand with the neurological, orthopedic and x-ray departments before a positive diagnosis was given in many cases. It is with this class of referred pains that our best results have often been obtained.

Duration of symptoms mentioned in 199 cases, or 66.3 per cent. of the total number.

1 to 29 days in.....	28 cases, or 14.0 per cent.
1 month to 6 months.....	55 cases, or 27.6 per cent.
7 months to 11 months.....	11 cases, or 5.5 per cent.
1 year to 5 years.....	75 cases, or 37.7 per cent.
6 years to 10 years.....	17 cases, or 8.5 per cent.
11 years to 20 years.....	13 cases, or 6.5 per cent.

Shortest 2 days; longest 20 years.

The frequency with which so many of these patients have gone so long before consulting a urologist is quite noticeable. Over 50 per cent. go for over a year. Most of these patients have run the gauntlet and have been treated for the referred pain group or the sexual upsets. It seems hard to get the profession to realize that the prostate and vesicles can be responsible for pain in the back and legs, and also for them to realize that sexual derangements can be caused by the most important part of the sexual apparatus. It is, indeed, shocking to see how many of these patients have been treated for such periods for so many diseases, before their genital tract has been considered.

#### EXAMINATION.

*Discharge.*—Discharge mentioned in 134 cases, or 44.6 per cent. of total number.

Present in 62 cases, or 46.2 per cent.

Absent in 72 cases, or 53.8 per cent.

Most often mucopurulent, seldom profuse.

It will be noticed that in the classification of the symptoms the patients complained of, discharge was present in 67 per cent., whereas on admission to the clinic only 46 per cent. of them had enough discharge in the daytime to be perceptible. This is of course due to the fact that the discharge is not sufficient to appear except after a long interval of urination.

*Urine.*—Urine mentioned in 250 cases, or 83.3 per cent. of total number.

Changes in 199 cases, or 79.6 per cent. of those mentioned.

No changes in 51 cases, or 20.4 per cent. of those mentioned.

The most frequent change noticed was the presence of shreds in the first glass of urine.

Next in order of frequency:—

Glass 1, cloudy; glass 2, clear.

Glass 1, cloudy or hazy; glass 2, hazy or cloudy.

Glass 1, hazy; glass 2, clear.

External genitalia mentioned in 183 cases, or 61 per cent. of total number.

Negative in 84 cases, or 45.9 per cent. of those mentioned.

Positive in 99 cases, or 54.1 per cent. of those mentioned.

*External Genitalia.*—Most frequent lesions in order of occurrence were:—

Chronic epididymitis (left).

Chronic epididymitis (right).

Varicocele (left).

Varicocele bilateral.

Phimosis, atrophy left testicle, spermatocele and hydrocele.

*Prostate and Vesicles.*—Prostate and vesicles mentioned in 248 cases, or 82.6 per cent. total number of cases.

No changes in 10 cases, or 4 per cent.

No changes in 238 cases, or 96 per cent.

Most often slightly enlarged, indurated and somewhat adherent.

*Secretion.*—Secretion examination in 195 cases, or 65 per cent. of total.

Pus in 131 cases, or 67.2 per cent. of those examined.

Pus and spermatozoa in 23 cases, or 11.8 per cent. of those examined.

Pus and blood in 14 cases, or 7.2 per cent. of those examined.

Blood in 6 cases, or 3 per cent.

Spermatozoa in 5 cases, or 2.5 per cent.

Watery in 2 cases, or 1 per cent.

No pus in 14 cases, or 7.2 per cent.

Presence of Stricture:—

*Bougie-a-Boule* in 124 cases, or 41.3 per cent. of total number.

Filiform in 5 cases, or 4 per cent. of cases examined.

10 to 20 F. in 20 cases, or 16.1 per cent.

Small meatus 6 cases, or 4.9 per cent., that is in 25 per cent. of the cases there was an associated stricture under 20 F.

Average Number of Treatments:—

40 per cent. of the patients were treated at least 20 times.

About 30 per cent. under 10 times.

15 per cent. from 20- 40 times.

4 per cent. from 41- 50 times.

2 per cent. from 51- 60 times.

4.6 per cent. from 61-100 times.

3.6 per cent. from 101-200 times.

.6 per cent. from 201-300 times, or 70 per cent. of these patients were treated over 20 times.

Duration of Treatment in 296 Cases.

1 to 7 days .....78 cases, or 26.4 per cent.

8 to 30 days .....53 cases, or 17.9 per cent.

1 to 3 months .....85 cases, or 28.7 per cent.

4 to 6 months .....26 cases, or 8.8 per cent.

7 to 12 months .....24 cases, or 8.1 per cent.

13 to 24 months.....20 cases, or 6.8 per cent.

25 to 36 months..... 4 cases, or 1.3 per cent.

36 to 55 months..... 6 cases, or 2 per cent.

About 55 per cent. were treated for a month or over and only about one-fourth of them ceased treatment within a week. These two latter tables seem to indicate that about 70 to 75 per cent. of the cases of these chronic infections appearing at the clinic are treated over a fairly satisfactory period.



Associated conditions most frequent: Syphilis, gonorrhea, hemorrhoids and rectal conditions, tabes bladder, hypertrophy of the prostate, arthritis, inguinal adenitis, acne, hernia, and herpes progenitalis.

Results mentioned in 138 cases, or 46 per cent. of total number.

Improved, 97 cases, or 70.3 per cent. of those mentioned.

Not improved, 41 cases, or 29.7 per cent. of those mentioned.

We have used *improved* instead of *cured*, because it is rather difficult to state when any chronic infection is definitely and permanently cured, and these cases have been too recent to give late results. We have put under the improved list, patients who were relieved either entirely or almost completely of the symptoms for which they came to the clinic. It is noted that 70 per cent. of these cases were improved, and that 70 per cent. of the cases had treatments extending over a fairly satisfactory period. Therefore it would seem that in our clinic cases, which have come to us and received their proper treatment, results have been secured, and we are delighted that such a high percentage shows improvement.

#### CONCLUSIONS.

1. Twenty-five per cent. of these cases were associated with stricture.

2. Referred pains, such as backache and sciatica, were the most frequent symptoms, and often the ones in which the best results were secured.

3. Patients with referred pains were the ones who had gone for long periods with all sorts of treatment before the prostate and vesicles were suspected. This suggests that the profession should be mindful of the prostate and vesicles as the cause of these various referred pains.

4. Patients were treated by the usual massage, irrigations, endoscopic applications, instillations, dilatations and vaccines. Quite a number of the patients who resisted these standard measures were immediately improved by vasostomy.

5. As 70 to 75 per cent. of these clinic patients were treated for periods ranging from one to several years with visits numbering from 10 to 300, we feel that the majority of our dispensary patients suffering with prostate and vesicle infections are receiving quite a satisfactory therapy.

THE VALUE OF THE ROENTGEN RAY IN THE DIAGNOSIS  
OF VESICAL CALCULUS.

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It is not as yet generally recognized that the roentgen ray fails to demonstrate vesical calculi in many instances. Too often entire reliance is placed upon the radiograph for the diagnosis of stone in the bladder, a negative finding being accepted as proof of the absence of calculus.

In a paper dealing with this question Beer\* called attention to this fact and reported a series of 22 cases of vesical calculus which were radiographed. In this series only 6 calculi showed in the roentgenograms. Of the 16 negative cases in which stones were found at operation or cystoscopy, the calculi were examined chemically in nine instances. They were found to be either uric acid or uratic in composition. In all the cases the calculi were demonstrated cystoscopically. The radiograms were taken by efficient workers, so that the high percentage of negative results could not be attributed to poor technique.

I have collected an additional series of cases of vesical calculi thus bringing the material up to date from the time of Beer's paper. All the radiograms were taken by experienced technicians, and reexamination of negative cases (practised in a number of instances) gave identical negative findings. This series comprises 35 cases of vesical calculi. X-ray was positive in 16, negative in 19 cases, *i. e.*, in a little over 50 per cent. of the patients. All the cases were diagnosed by cystoscopic examination with two exceptions. In these the instrument could not be introduced into the bladder on account of associated prostatic enlargement; the diagnosis was here made with the stone searcher. In a few of the cases the calculi could be palpated by combined recto-abdominal palpation. Of the 19 negative cases, 10 had an associated prostatic adenoma. The stones which did not show in the radiogram varied in size from a marble to a hen's egg. Obesity was not the exclusive cause for negative pictures, for large stones could not be demonstrated in rather thin individuals. Prostatic enlargement did not seem to be responsible for so many negative findings, for enlargement was noted in many of the cases that showed distinct shadows.

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\**Jour. Amer. Med. Assoc.*, October 11th, 1913.

Of the 19 negative cases, 10 were examined chemically in the Mt. Sinai Hospital Chemical Laboratory. The analysis of the 10 negative cases showed the following:—

Case	I.—Uric Acid.
Case	II.—Uric Acid.
Case	III.—Uric Acid.
	Ammonium Urate.
	Traces of Mag. Phosph.
Case	IV.—Ammonium Urates.
	Cal. Sulphate.
Case	V.—Cal. Phosphate.
	Am. Mag. Phosph.
	Uric Acid—traces.
Case	VI.—Ammonium Urates.
Case	VII.—Uric Acid and Sodium Urate.
Case	VIII.—Uric Acid.
Case	IX.—Ammonium Urates.
Case	X.—Sodium and Potassium Urate.

It is of value to have a chemical examination made of every calculus, renal or vesical. No definite information can be obtained from the color or consistency of the calculus. The importance of careful chemical examination has lately been demonstrated in regard to renal calculi. Formerly most of them were thought to be composed of uric acid and urates. Recent investigations have shown that calcium oxalate is the predominating chemical constituent. The calculi which gave positive radiographic findings were for the most part composed of carbonates, phosphates, and oxalates.

To summarize the statistics of both series of cases: 57 cases of vesical calculi were examined roentgenographically—of these 35, or about 61 per cent., failed to show in the radiogram. All but 2 were detected cystoscopically. There can be no question that this is the most reliable procedure in the diagnosis of vesical calculus. In all the calculi, with one exception, uric acid and urates were the predominant chemical constituents.

At present there are two methods which have been suggested to render invisible stones opaque to the rays. One is the coating of the calculus with a silver salt, either argyrol or collargol, the other is the roentgenogram of the air-inflated bladder. The former has been unsuccessful in the few cases of bladder stone in which we have used it. The method also failed in a number of ureteral calculi which did not show radiographically. The air inflation procedure was only used in a few instances, and in one case gave a suggestion of a shadow where stone was previously present. When cystoscopy cannot be performed and stone is suspected, it may prove advisable to attempt one or both of these methods.

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NOTE.—I wish to thank Dr. Charles A. Elsberg for his kind permission to use his records in 7 of the cases in this series.



## DEATH AFTER BLADDER OPERATION.

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The gravity of vesical traumatism has always been appreciated. Even in olden times the physicians considered injuries to the urinary bladder a serious accident, some of them even going so far as to put them in the same line with injuries of the stomach, classifying both as fatal.

In fact, injuries to the bladder will almost invariably lead to immediate collapse, which, however, may be of short duration. That may explain why surgical interferences with the bladder in old men are always to be considered as operations of pronounced dignity, though they may only be simple cystotomies or cystostomies.

While such cases of extremely low resistance are beyond our control, it seems worth while, nevertheless, to examine into other conditions apt to produce untoward results after bladder operations, and to investigate how far it may be possible to counteract these sinister influences.

It does not require any argument to convince one that if an individual be in condition, he will be more able to overcome the shock of the operation, the influence of the anesthetic, and the infection frequently following the operation. To place the patient, previous to the interference, into the most favorable condition is subsumed under the expression of proper preparation. The leading points in this issue are the regulation of the digestive functions (bowels in old men are, as a rule, sluggish), the stimulation of the renal excretion, the proper attention to the function of the heart, and the supervising of the whole breathing apparatus. Under the heading of preparatory measures may also be subsumed preparatory cystotomy in cases of urosepsis. But all these measures must not be carried out in a perfunctory way, but to a point that satisfies the observer that the patient has actually reached the best condition available under the conditions existing. Another important item of the preparatory stage is the interpolation of a proper amount of time between examination and operation. The so-called urethral fever is apt to set in after any instrumentation inside the urinary tract; this is especially true in cystoscopy, which calls for good-sized instruments and a rather extended time of manipulation. It should be kept in mind that this septic infection, expressed by the urethral

fever, does not, in elderly individuals, as a rule, become clinically evident before two or three days. If the operation should follow the cystoscopy or any other instrumentation at too short an interval, the height of the reaction to this infection may coincide with the reaction to the operation, thus putting an overwhelming demand to the reserve power of the patient's body. Therefore, the operation should not be undertaken until assurance is gained that no urethral fever will develop. It may be added that the simple and smooth instrument will be less apt to traumatize the urethral mucosa, thus reducing the danger of creating points of entrance for the infection, than a more complex instrument of a larger circumference and carrying sharp edges.

Another group of dangerous possibilities comprises instances directly due to the various traumatisms inflicted upon the structures during the progress of the operation. It is known that a bladder, still equipped with its normal epithelial lining, has practically no absorbing tendencies, but that if this epithelial protection is destroyed and missing, rather rapid absorption will take place. Now it is a rather common surgical misdemeanor that during the course of a vesical operation a great deal of unnecessary wiping of the mucosa is done, and, moreover, with rather rough gauze sponges. As a clinical evidence of the destruction of the epithelial lining by this manipulation, quite a free hemorrhage follows such an interference. It is obvious that any extensive denuding of the vesical mucosa will enhance the absorption of the infectious material present in the bladder; therefore, wiping inside the viscus should be abolished in favor of sponging, and this must be done very carefully and limited to the absolute necessity. Another important item is the proper use of retractors applied for clearing the interior of the bladder. It is so often overlooked by the operator that, in order to expose the trigonum, retractors should be inserted in the lower and upper angle of the wound, thus exerting caudo-occipital traction; and that the insertion of retractors into the lateral edges of the wound is not only superfluous, but the subsequent frontal traction accomplishes only a disappearance of the trigonum. But that is not the worst.

Quite a few operators are using, for the lateral traction, retractors with very long blades, reaching way down into the base of the bladder. If any great force is brought to bear on these retractors, quite serious untoward incidents may result. It is rather frequent in elderly individuals, suffering from vesical pathology, that the ureters are in a condition of acute or chronic inflammation. If now by a lateral retractor considerable pressure is exerted on the intramural end of one or both of the ureters, submucous hemorrhage and edema may be produced at the distal end of the ureter, thus causing quite considerable interference with the urinary flow from

the kidney to the bladder. Taking into calculation that renal disturbances are the common thing in the patients alluded to above, it will easily be understood that such an accident is very liable to throw off entirely its precarious balance on an already damaged kidney. At two post-mortems I was able to trace this condition to perfect evidence. Therefore, if a necessity arises for the use of lateral retractors, their blades ought to be short ones, and special care should be taken not to squeeze the bottom of the bladder, where the oblique insertion of the ureter into the vesical wall is located.

Another instance in the completing of a bladder operation deserves discussion, and that is the drainage of the strata overlaying the bladder. Experience has shown that the traditional method of draining at these points is not satisfactory or reliable. Usually one drain is placed into the retrosymphyseal space and another drain somewhere into the suture line and at a right angle to it. If infection occurs underneath the suture line, the central end of the drainage tube is walled off by the infiltration and no relief is furnished. The importance of such an accident must not be underrated. The tension under the fascia soon becomes very great, leading to necrosis of the tissue and forced absorption of the products of infection. Elderly patients are very apt to succumb quickly to this infection, or the prolonged malaise following sloughing of the fascia exhausts their physical resources later on. Therefore, it is very important to establish a safe and thorough drainage of the sub-fascial space, which is accomplished by placing a drainage tube underneath the fascial suture line, the ends of which tube emanate at either angle of the suture line of the skin. Although the importance of the after-treatment following vesical operations is always appreciated in an academic way, the timely administration of its essentials and the intensity of its execution are quite often sinned against.

The forced intake of fluids after genito-urinary operations is widely appreciated and recommended; but how often is this omitted until the patient shows all the evidence of a drying-out process, barky tongue, hot, dry skin, drowsiness? Then our whole armament ready to fight this condition is mobilized in a hurry, but unfortunately too late in a good many instances. Here, again, prevention is so much more useful than repair. The maintenance of elimination has to be attended to directly after the operation,—that is before the danger signals are hoisted. The drop method of colonic irrigation has to be established as a matter of routine as soon as feasible after the operation, and a 4 per cent. glucose solution has the preference on account of its nourishing qualities. The rectoclysis has to be kept up until the patient is able to take a sufficient quantity of fluid by mouth. As soon as the patient is in this condition diuretin has to be administered regularly.



The blood-pressure has to be watched constantly, in case it should drop considerably below the pre-operative level, adrenalin has to be administered intravenously, and this should be repeated at each such instance.

The heart action should be under surveillance all the time, and the proper stimulants should be given without delay if the indication arises.

The treatment of sepsis following vesical operations needs a few words of comment.

We know only of one efficient handling of this condition, and that is the regularly repeated intravenous influx of large quantities of fluid. Again a glucose solution is to be recommended for this purpose, on account of the elective nourishing action of sugar on the heart.

The appearance of the ominous crossing of the temperature and pulse curve calls for immediate administration of this measure.

In summing up, we may offer the following rules for the improvement of the results of bladder operations:—

1. Painstaking preparation of the patient.
2. Avoidance of unnecessary traumatism during the operation.
3. Beginning of the after-treatment instantaneously after the patient has been returned to his bed.

## SPECIAL ARTICLE.

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### 'LITTLE CLASSICS' PHYSICIANS MAY HAVE OVERLOOKED.

[We Americans are a bit timid when it is a matter of expressing our opinion of our own writers. Now, this timidity may arise from either of two sources: our innate modesty, or our lack of culture to know what is chaff and what is grain in our literature. It surely cannot be our innate modesty that makes us withhold our opinion, for as a nation we are far removed from this beneficent quality; so it must be that we are lacking in perspicacity and acumen when the question is put to us to decide whether an author's works are just for the moment or of such stuff that they will outlast several generations. A case in point is O. Henry (Sydney Porter), for though during his life he had a large following and received considerable praise from our so-called critics, no critic was great enough, or daring enough, or original enough, to say here is a writer of genius who should be acclaimed as an honor to American literature. But now, that this gifted man has been dead for some years, a feeling is creeping over us that both public and critics read O. Henry in the past without the serious thought which should have been given him as an outstanding figure in our literature, and this realization, as is usually the case with us, will have to be abetted abroad before complete cognizance of the fact is taken in this country. In *Current Opinion* for July are some pertinent statements on the neglect of O. Henry in Europe, and following the discussion, as set forth in the article, there is no doubt that searching criticisms will be instituted before long by French and English critics, and then here in America there will be brought home to us the fact that we must regard O. Henry as a classic or be shamed before the world. It was the appreciation of Edgar Allan Poe in France that made his reputation at home, and this also applies to Walt Whitman; and it was in England that Henry James and the author of "The Red Badge of Courage" got the recognition which is so much to the literary man who longs for something besides ephemeral fame.]

In presenting the story, "Let Me Feel Your Pulse," the thought has been to make those medical readers, who know nothing of the art of O. Henry, familiar with a specimen of it that leaves nothing to be desired. Aside from the truthfulness of the picture of a neurasthenic and the author's happy faculty of hitting off the manner in which doctors approach this sort of patient, the story reaches a high plane by its directness, its humor and its very human note. After reading a number of O. Henry's stories one must agree with Dr. Rudolf Matas, of New Orleans, that O. Henry is the Guy de Maupassant of America, an opinion Dr. Matas stated to the writer of these lines only a few weeks ago.—LITERARY EDITOR.]

### LET ME FEEL YOUR PULSE.\*

So I went to a doctor.

"How long has it been since you took any alcohol into your system?" he asked.

Turning my head sidewise, I answered, "Oh, quite awhile."

He was a young doctor, somewhere between twenty and forty. He wore heliotrope socks, but he looked like Napoleon. I liked him immensely.

"Now," said he, "I am going to show you the effect of alcohol upon your circulation." I think it was "circulation" he said; though it may have been "advertising."

He bared my left arm to the elbow, brought out a bottle of whiskey, and gave me a drink. He began to look more like Napoleon. I began to like him better.

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\*Taken from O. Henry's "Sixes and Sevens." Doubleday, Page & Co., Garden City, New York. 1911.

Then he put a tight compress on my upper arm, stopped my pulse with his fingers, and squeezed a rubber bulb connected with an apparatus on a stand that looked like a thermometer. The mercury jumped up and down without seeming to stop anywhere; but the doctor said it registered two hundred and thirty-seven or one hundred and sixty-five or some such number.

"Now," said he, "you see what alcohol does to the blood-pressure."

"It's marvelous," said I, "but do you think it a sufficient test? Have one on me, and let's try the other arm." But, no!

Then he grasped my hand. I thought I was doomed and he was saying good-bye. But all he wanted to do was to jab a needle into the end of a finger and compare the red drop with a lot of fifty-cent poker chips that he had fastened to a card.

"It's the hæmoglobin test," he explained. "The colour of your blood is wrong."

"Well," said I, "I know it should be blue; but this is a country of mixups. Some of my ancestors were cavaliers; but they got thick with some people on Nantucket Island, so——"

"I mean," said the doctor, "that the shade of red is too light."

"Oh," said I, "it's a case of matching instead of matches."

The doctor then pounded me severely in the region of the chest. When he did that I don't know whether he reminded me most of Napoleon or Battling or Lord Nelson. Then he looked grave and mentioned a string of grievances that the flesh is heir to—mostly ending in "itis." I immediately paid him fifteen dollars on account.

"Is or are it or some or any of them necessarily fatal?" I asked. I thought my connection with the matter justified my manifesting a certain amount of interest.

"All of them," he answered cheerfully. "But their progress may be arrested. With care and proper continuous treatment you may live to be eighty-five or ninety."

I began to think of the doctor's bill. "Eighty-five would be sufficient, I am sure," was my comment. I paid him ten dollars more on account.

"The first thing to do," he said, with renewed animation, "is to find a sanitarium where you will get a complete rest for a while, and allow your nerves to get into a better condition. I myself will go with you and select a suitable one."

So he took me to a mad-house in the Catskills. It was on a bare mountain frequented only by infrequent frequenters. You could see nothing but stones and boulders, some patches of snow, and scattered pine trees. The young physician in charge was most agreeable. He gave me a stimulant without applying a compress to the arm. It was luncheon time, and we were invited to partake. There were about twenty inmates at little tables in the dining-room. The young physician in charge came to our table and said: "It is a custom with our guests not to regard themselves as patients, but merely as tired ladies and gentlemen taking a rest. Whatever slight maladies they may have are never alluded to in conversation."

My doctor called loudly to a waitress to bring some phosphoglycerate of lime hash, dog-bread, bromoseltzer pancakes, and nuxvomica tea for my repast. Then a sound arose like a sudden wind storm among pine trees. It was produced by every guest in the



room whispering loudly, "Neurasthenia!"—except one man with a nose, whom I distinctly heard say, "Chronic alcoholism." I hope to meet him again. The physician in charge turned and walked away.

An hour or so after luncheon he conducted us to the workshop—say fifty yards from the house. Thither the guests had been conducted by the physician in charge's understudy and sponge-holder—a man with feet and a blue sweater. He was so tall that I was not sure he had a face; but the Armour Packing Company would have been delighted with his hands.

"Here," said the physician in charge, "our guests find relaxation from past mental worries by devoting themselves to physical labour—recreation, in reality."

There were turning-lathes, carpenters' outfits, clay-modelling tools, spinning-wheels, weaving-frames, treadmills, bass drums, enlarged-crayon-portrait apparatuses, blacksmith forges, and everything, seemingly, that could interest the paying lunatic guests of a first-rate sanitarium.

"The lady making mud pies in the corner," whispered the physician in charge, "is no other than—Lula Lulington, the authoress of the novel entitled 'Why Love Loves.' What she is doing now is simply to rest her mind after performing that piece of work."

I had seen the book. "Why doesn't she do it by writing another one instead?" I asked.

As you see, I wasn't as far gone as they thought I was.

"The gentleman pouring water through the funnel," continued the physician in charge, "is a Wall Street broker broken down from overwork."

I buttoned my coat.

Others he pointed out were architects playing with Noah's arks, ministers reading Darwin's "Theory of Evolution," lawyers sawing wood, tired-out society ladies talking Ibsen to the blue-sweated sponge-holder, a neurotic millionaire lying asleep on the floor, and a prominent artist drawing a little red wagon around the room.

"You look pretty strong," said the physician in charge to me. "I think the best mental relaxation for you would be throwing small boulders over the mountainside and then bringing them up again."

I was a hundred yards away before my doctor overtook me.

"What's the matter?" he asked.

"The matter is," said I, "that there are no aeroplanes handy. So I am going to merrily and hastily jog the foot-pathway to yon station and catch the first unlimited-soft-coal express back to town."

"Well," said the doctor, "perhaps you are right. This seems hardly the suitable place for you. But what you need is rest—absolute rest and exercise."

That night I went to a hotel in the city, and said to the clerk: "What I need is absolute rest and exercise. Can you give me a room with one of those tall folding beds in it, and a relay of bellboys to work it up and down while I rest?"

The clerk rubbed a speck off one of his finger nails and glanced sidewise at a tall man in a white hat sitting in the lobby. That man came over and asked me politely if I had seen the shrubbery

at the west entrance. I had not, so he showed it to me and then looked me over.

"I thought you had 'em," he said, not unkindly, "but I guess you're all right. You'd better go see a doctor, old man."

A week afterward my doctor tested my blood-pressure again without the preliminary stimulant. He looked to me a little less like Napoleon. And his socks were of a shade of tan that did not appeal to me.

"What you need," he decided, "is sea air and companionship."

"Would a mermaid—" I began; but he slipped on his professional manner.

"I myself," he said, "will take you to the Hotel Bonair off the coast of Long Island and see that you get in good shape. It is a quiet, comfortable resort where you will soon recuperate."

The Hotel Bonair proved to be a nine-hundred-room fashionable hostelry on an island off the main shore. Everybody who did not dress for dinner was shoved into a side dining-room and given only a terrapin and a champagne table d'hôte. The bay was a great stamping ground for wealthy yachtsmen. The *Corsair* anchored there the day we arrived. I saw Mr. Morgan standing on deck eating a cheese sandwich and gazing longingly at the hotel. Still, it was a very inexpensive place. Nobody could afford to pay their prices. When you went away you simply left your baggage, stole a skiff, and beat it for the mainland in the night.

When I had been there one day I got a pad of monogrammed telegraph blanks at the clerk's desk and began to wire to all my friends for get-away money. My doctor and I played one game of croquet on the golf links and went to sleep on the lawn.

When we got back to town a thought seemed to occur to him suddenly. "By the way," he asked, "how do you feel?"

"Relieved of very much," I replied.

Now a consulting physician is different. He isn't exactly sure whether he is to be paid or not, and this uncertainty insures you either the most careful or the most careless attention. My doctor took me to see a consulting physician. He made a poor guess and gave me careful attention. I liked him immensely. He put me through some coordination exercises.

"Have you a pain in the back of your head?" he asked. I told him I had not.

"Shut your eyes," he ordered, "put your feet close together, and jump backward as far as you can."

I always was a good backward jumper with my eyes shut, so I obeyed. My head struck the edge of the bathroom door, which had been left open and was only three feet away. The doctor was very sorry. He had overlooked the fact that the door was open. He closed it.

"Now touch your nose with your right forefinger," he said.

"Where is it?" I asked.

"On your face," said he.

"I mean my right forefinger," I explained.

"Oh, excuse me," said he. He reopened the bathroom door, and I took my finger out of the crack of it. After I had performed the marvelous digito-nasal feat I said:

"I do not wish to deceive you as to symptoms, Doctor; I really have something like a pain in the back of my head." He ignored

the symptoms and examined my heart carefully with a latest-popular-air-penny-in-the-slot ear-trumpet. I felt like a ballad.

"Now," he said, "gallop like a horse for about five minutes around the room."

I gave the best imitation I could of a disqualified Percheron being led out of Madison Square Garden. Then, without dropping in a penny, he listened to my chest again.

"No glanders in our family, Doc," I said.

The consulting physician held up his forefinger within three inches of my nose. "Look at my finger," he commanded.

"Did you ever try Pears'——" I began; but he went on with his test rapidly.

"Now look across the bay. At my finger. Across the bay. At my finger. At my finger. Across the bay. Across the bay. At my finger. Across the bay." This for about three minutes.

He explained that this was a test of the action of the brain. It seemed easy to me. I never once mistook his finger for the bay. I'll bet that if he had used the phrases: "Gaze, as it were, unpreoccupied, outward—or rather laterally—in the direction of the horizon, underlaid, so to speak, with the adjacent fluid inlet," and "Now, returning—or rather, in a manner, withdrawing your attention, bestow it upon my upraised digit"—I'll bet, I say, that Henry James himself could have passed the examination.

After asking me if I had ever had a grand uncle with curvature of the spine or a cousin with swelled anklets, the two doctors retired to the bathroom and sat on the edge of the bath tub for their consultation. I ate an apple, and gazed first at my finger and then across the bay.

The doctors came out looking grave. More: they looked tombstones and Tennessee-papers-please-copy. They wrote out a diet list to which I was to be restricted. It had everything that I had ever heard of to eat on it, except snails. And I never eat a snail unless it overtakes me and bites me first.

"You must follow this diet strictly," said the doctors.

"I'd follow it a mile if I could get one-tenth of what's on it," I answered.

"Of next importance," they went on, "is outdoor air and exercise. And here is a prescription that will be of great benefit to you."

Then all of us took something. They took their hats, and I took my departure.

I went to a druggist and showed him the prescription.

"It will be \$2.87 for an ounce bottle," he said.

"Will you give me a piece of your wrapping cord?" said I.

I made a hole in the prescription, ran the cord through it, tied it around my neck, and tucked it inside. All of us have a little superstition, and mine runs to a confidence in amulets.

Of course there was nothing the matter with me, but I was very ill. I couldn't work, sleep, eat, or bowl. The only way I could get any sympathy was to go without shaving for four days. Even then somebody would say: "Old man, you look as hardy as a pine knot. Been up for a jaunt in the Maine woods, eh?"

Then, suddenly, I remembered that I must have outdoor air and exercise. So I went down South to John's. John is an approximate relative by verdict of a preacher standing with a little book in



his hands in a bower of chrysanthemums while a hundred thousand people looked on. John has a country house seven miles from Pineville. It is at an altitude and on the Blue Ridge Mountains in a state too dignified to be dragged into this controversy. John is mica, which is more valuable and clearer than gold.

He met me at Pineville, and we took the trolley car to his home. It is a big, neighbourless cottage on a hill surrounded by a hundred mountains. We got off at his little private station, where John's family and Amaryllis met and greeted us. Amaryllis looked at me a trifle anxiously.

A rabbit came bounding across the hill between us and the house. I threw down my suit-case and pursued it hotfoot. After I had run twenty yards and seen it disappear, I sat down on the grass and wept disconsolately.

"I can't catch a rabbit any more," I sobbed. "I'm of no further use in the world. I may as well be dead."

"Oh, what is it—what is it, Brother John?" I heard Amaryllis say.

"Nerves a little unstrung," said John, in his calm way. "Don't worry. Get up, you rabbit-chaser, and come on to the house before the biscuits get cold." It was about twilight, and the mountains came up nobly to Miss Murfree's descriptions of them.

Soon after dinner I announced that I believed I could sleep for a year or two, including legal holidays. So I was shown to a room as big and cool as a flower garden, where there was a bed as broad as a lawn. Soon afterward the remainder of the household retired, and then there fell upon the land a silence.

I had not heard a silence before in years. It was absolute. I raised myself on my elbow and listened to it. Sleep! I thought that if I only could hear a star twinkle or a blade of grass sharpen itself I could compose myself to rest. I thought once that I heard a sound like the sail of a catboat flapping as it veered about in a breeze, but I decided that it was probably only a tack in the carpet. Still I listened.

Suddenly some belated little bird alighted upon the window-sill, and, in what he no doubt considered sleepy tones, enunciated the noise generally translated as "cheep!"

I leaped into the air.

"Hey! what's the matter down there?" called John from his room above mine.

"Oh, nothing," I answered, "except that I accidentally bumped my head against the ceiling."

The next morning I went out on the porch and looked at the mountains. There were forty-seven of them in sight. I shuddered, went into the big hall sitting room of the house, selected "Pancoast's Family Practice of Medicine" from a bookcase, and began to read. John came in, took the book away from me, and led me outside. He has a farm of three hundred acres furnished with the usual complement of barns, mules, peasantry, and harrows with three front teeth broken off. I had seen such things in my childhood, and my heart began to sink.

Then John spoke of alfalfa, and I brightened at once. "Oh, yes," said I, "wasn't she in the chorus of—let's see——"

"Green, you know," said John, "and tender, and you plow it under after the first season."

"I know," said I, "and the grass grows over her."

"Right," said John. "You know something about farming after all."

"I know something of some farmers," said I, "and a sure scythe will mow them down some day."

On the way back to the house a beautiful and inexplicable creature walked across our path. I stopped irresistibly fascinated, gazing at it. John waited patiently, smoking his cigarette. He is a modern farmer. After ten minutes he said: "Are you going to stand there looking at that chicken all day? Breakfast is nearly ready."

"A chicken?" said I.

"A White Orpington hen, if you want to particularize."

"A White Orpington hen?" I repeated, with intense interest. The fowl walked slowly away with graceful dignity, and I followed like a child after the Pied Piper. Five minutes more were allowed me by John, and then he took me by the sleeve and conducted me to breakfast.

After I had been there a week I began to grow alarmed. I was sleeping and eating well and actually beginning to enjoy life. For a man in my desperate condition that would never do. So I sneaked down to the trolley-car station, took the car for Pineville, and went to see one of the best physicians in town. By this time I knew exactly what to do when I needed medical treatment. I hung my hat on the back of a chair, and said rapidly:

"Doctor, I have cirrhosis of the heart, indurated arteries, neurasthenia, neuritis, acute indigestion, and convalescence. I am going to live on a strict diet. I shall also take a tepid bath at night and a cold one in the morning. I shall endeavour to be cheerful, and fix my mind on pleasant subjects. In the way of drugs I intend to take a phosphorous pill three times a day, preferably after meals; and a tonic composed of the tinctures of gentian, cinchona, calisaya, and cardamom compound. Into each teaspoonful of this I shall mix tincture of nux vomica, beginning with one drop and increasing it a drop each day until the maximum dose is reached. I shall drop this with a medicine-dropper, which can be procured at a trifling cost at any pharmacy. Good morning."

I took my hat and walked out. After I had closed the door I remembered something that I had forgotten to say. I opened it again. The doctor had not moved from where he had been sitting, but he gave a slightly nervous start when he saw me again.

"I forgot to mention," said I, "that I shall also take absolute rest and exercise."

After this consultation I felt much better. The reestablishing in my mind of the fact that I was hopelessly ill gave me so much satisfaction that I almost became gloomy again. There is nothing more alarming to a neurasthenic than to feel himself growing well and cheerful.

John looked after me carefully. After I had evinced so much interest in his White Orpington chicken he tried his best to divert my mind, and was particular to lock his hen house of nights. Gradually the tonic mountain air, the wholesome food, and the daily walks among the hills so alleviated my malady that I became utterly wretched and despondent. I heard of a country doctor who lived in the mountains nearby. I went to see him and told him the

whole story. He was a gray-bearded man with clear, blue, wrinkled eyes, in a home-made suit of gray jeans.

In order to save time I diagnosed my case, touched my nose with my right forefinger, struck myself below the knee to make my foot kick, sounded my chest, stuck out my tongue, and asked him the price of cemetery lots in Pineville.

He lit his pipe and looked at me for about three minutes. "Brother," he said, after a while, "you are in a mighty bad way. There's a chance for you to pull through, but it's a mighty slim one."

"What can it be?" I asked eagerly. "I have taken arsenic and gold, phosphorus, exercise, nux vomica, hydrotherapeutic baths, rest, excitement, codein, and aromatic spirits of ammonia. Is there anything left in the pharmacopœia?"

"Somewhere in these mountains," said the doctor, "there's a plant growing—a flowering plant that'll cure you, and it's about the only thing that will. It's of a kind that's as old as the world; but of late it's powerful scarce and hard to find. You and I will have to hunt it up. I'm not engaged in active practice now: I'm getting along in years; but I'll take your case. You'll have to come every day in the afternoon and help me hunt for this plant till we find it. The city doctors may know a lot about new scientific things, but they don't know much about the cures that nature carries around in her saddle-bags."

So every day the old doctor and I hunted the cure-all plant among the mountains and valleys of the Blue Ridge. Together we toiled up steep heights so slippery with fallen autumn leaves that we had to catch every sapling and branch within our reach to save us from falling. We waded through gorges and chasms, breast-deep with laurel and ferns; we followed the banks of mountain streams for miles; we wound our way like Indians through brakes of pine—road side, hill side, river side, mountain side we explored in our search for the miraculous plant.

As the old doctor said, it must have grown scarce and hard to find. But we followed our quest. Day by day we plumbed the valleys, scaled the heights, and tramped the plateaus in search of the miraculous plant. Mountain-bred, he never seemed to tire. I often reached home too fatigued to do anything except fall into bed and sleep until morning. This we kept up for a month.

One evening after I had returned from a six-mile tramp with the old doctor, Amaryllis and I took a little walk under the trees near the road. We looked at the mountains drawing their royal-purple robes around them for their night's repose.

"I'm glad you're well again," she said. "When you first came you frightened me. I thought you were really ill."

"Well again!" I almost shrieked. "Do you know that I have only one chance in a thousand to live?"

Amaryllis looked at me in surprise. "Why," said she, "you are as strong as one of the plough-mules, you sleep ten or twelve hours every night, and you are eating us out of house and home. What more do you want?"

"I tell you," said I, "that unless we find the magic—that is, the plant we are looking for—in time, nothing can save me. The doctor tells me so."

"What doctor?"



"Doctor Tatum—the old doctor who lives halfway up Black Oak Mountain. Do you know him?"

"I have known him since I was able to talk. And is that where you go every day—is it he who takes you on these long walks and climbs that have brought back your health and strength? God bless the old doctor."

Just then the old doctor himself drove slowly down the road in his rickety old buggy. I waved my hand at him and shouted that I would be on hand the next day at the usual time. He stopped his horse and called to Amaryllis to come out to him. They talked for five minutes while I waited. Then the old doctor drove on.

When we got to the house Amaryllis lugged out an encyclopædia and sought a word in it. "The doctor said," she told me, "that you needn't call any more as a patient, but he'd be glad to see you any time as a friend. And then he told me to look up my name in the encyclopædia and tell you what it means. It seems to be the name of a genus of flowering plants, and also the name of a country girl in Theocritus and Virgil. What do you suppose the doctor meant by that?"

"I know what he meant," said I. "I know now."

A word to a brother who may have come under the spell of the unquiet Lady Neurasthenia.

The formula was true. Even though gropingly at times, the physicians of the walled cities had put their fingers upon the specific medicament.

And so for the exercise one is referred to good Doctor Tatum on Black Oak Mountain—take the road to your right at the Methodist meeting house in the pine-grove.

Absolute rest and exercise!

What rest more remedial than to sit with Amaryllis in the shade, and, with a sixth sense, read the wordless Theocritan idyl of the gold-bannered blue mountains marching orderly into the dormitories of the night?

## DIAGNOSTIC AND THERAPEUTIC NOTES.

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GONORRHEAL ARTHRITIS.—Nordmann (*Medizin. Klinik*, 1915, No. 8). Any joint may become the seat of a gonorrheal inflammation. This is especially true of the small joints, such as the metacarpophalangeal and interphalangeal articulations, which are rarely the seat of an acute arthritis of non-gonorrheal origin and whose involvement is therefore almost pathognomonic for gonorrhea. If the inflammation occurs in the presence of a florid gonorrhea, the diagnosis is usually easy. If, however, the patient is the subject of a chronic gonorrhea or of a prostatitis without symptoms, the differential diagnosis between an acute gonorrheal and acute rheumatic arthritis may be difficult. If one or more of the small joints are involved or if the inflammation is confined to a single large joint, a gonorrheal origin should always be suspected, and a bacteriologic examination of the genito-urinary secretions made. Excessive pain and tenderness, and the resulting insomnia, speak rather for a gonorrheal than for a rheumatic arthritis. This will still more be the case, if the salicylates prove ineffectual.

The treatment of gonorrheal arthritis consists of four procedures: congestion, immobilization, extension and hot air. Medicaments are useless and the success of the above four mechanical methods varies with the individual. Ordinarily Bier's passive congestion gives excellent results but occasionally each application of the bandage is followed by increased pain. In that case an immobilizing bandage of paste-board, starch or plaster of Paris is to be applied. An involvement of shoulder or hip usually causes extreme pain and should be treated by means of extension. After the acute stage is past, the remaining abnormalities should be treated by means of the hot-air chamber, hot baths or careful active and passive exercises. A gonorrheal involvement of the knee often leads to an exudate. This should be aspirated without delay. In the elbow joint a purulent exudate is apt to form and to show no tendency to spontaneous absorption. Aspiration is inadvisable in this condition; incision is to be preferred.

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GENITO-URINARY SYMPTOMS ARISING FROM ANAL, RECTAL AND COLONIC DISEASES AND VICE VERSA.—Zobel (*Jour. Amer. Med. Assoc.*, 1916, Vol. 66, No. 7). A common cause of frequent and painful urination in male adults is the pressure on the bladder and prostatic urethra by a mass of feces in a distended rectum. This occurs especially when there happens to be added a severe proctitis due to the dyschezia. Like symptoms are caused by pressure on the bladder by the sigmoid when it is atonic, dilated and loaded, or when it is displaced, inflamed and filled with stagnating feces. This condition occurs much more frequently than is generally recognized, more especially so in women in whom a loop of the sigmoid may be held down by adhesions from a former pelvic inflammation. Thor-

oughly evacuating the colon by irrigation as a general rule brings about rapid amelioration of the vesical symptoms.

Vesical irritability not uncommonly accompanies neoplasms of the rectum and sigmoid, hemorrhoids and chronic mucous colitis. In the latter it may so predominate over all the other symptoms, even that of the periodic attacks of diarrhea, and there may be also such severe tenesmus, pain in the posterior urethra and tenderness over the bladder that patients not infrequently seek the advice of the urologist under the impression that their trouble is caused by disease of the prostate or bladder. Treatment of the genito-urinary symptoms of course will be of no avail. All therapy must be directed towards the colon before the urinary symptoms will be relieved.

Ulcerative conditions in and about the anal region, such as fissures, chancres, chancroids and perianal eczemas, are reflexly the cause of frequent and painful urination. With fissure in particular, the symptoms may so closely simulate those of the urethral stricture that treatment has already been instituted for the latter condition before the real cause was recognized.

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DIAGNOSTIC VALUE OF GONOCOCCUS VACCINE.—Asch and Adler (*Muench. Med. Wochenschr.*, 1916, No. 3). The importance of knowing with certainty, in an apparently cured case of gonorrhea, whether gonococci still remain latent in the urethral mucosa, can hardly be overestimated. A trustworthy method of determining this, consists in the diagnostic injection of a gonococcus vaccine. One or two injections of 25-125 million killed gonococci suffice to produce a reappearance in the urethral discharge of latent gonococci. They are usually somewhat degenerated, either large and swollen or small and shrunken, but can readily be recognized. No case of gonorrhea should be discharged as cured, unless this test has been done and has proved negative.

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A CASE OF TRUE HERMAPHRODITISM.—Photokis (*Virchows Arch.*, Vol. 221, No. 1). The patient, thirty-six years old, who had lived as a woman, came to autopsy. The external genitalia were male in appearance, though the penis was not perforated, the urethra opening at its base. The right scrotum contained a small testis, with vas deferens, that emptied into the right seminal vesicle. Between bladder and rectum lay a tube, connected with both, and consisting of vagina and uterus. From the left horn of the latter a tube extended, beside which lay an ovary. The true character of testis and ovary was demonstrated by microscopic examination. The case is thus unquestionably one of true hermaphroditism.

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REIMPLANTATION OF SEXUAL ORGANS.—Stocker (*Schweiz. Korr. Bl.*, 1916, No. 7). In cases of double castration, the usual ill effects can be prevented, if small portions of ovary or testis, as the case may be, are reimplanted. The portions used should consist, as nearly as possible, of normal glandular tissue. The results are usually satisfactory.

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METASTATIC PROSTATITIS.—Wildbolz (*Schweiz. Korr. Bl.*, 1916, No. 6). Within the last ten years, the writer has seen 14 cases of so-called influenza, that developed an acute prostatitis, apparently



metastatic in origin. The genito-urinary tract of these patients was otherwise normal. In addition, he saw 22 other cases of acute prostatitis, in which there was no gonorrhea, but in which the etiologic factor was not clear. The inflammatory process originates in the glandular tissue and the course of the disease is that of a follicular prostatitis. It begins with a chill, the fever is usually high, there is violent rectal and perineal pain with great tenesmus and urinary retention. It often ends with a hematuria. Of the 36 cases only 5 came to abscess.

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A DANGER IN PYELOGRAPHY.—Simmonds (*Muench. Med. Wochenschr.*, 1916, No. 7). On the third day after injecting 15 c.cm. of a 5 per cent. solution of collargol into the renal pelvis, the patient died. At the autopsy, it appeared that the collargol intoxication was not the cause of death, but that erosions in the ureter had permitted a bacterial invasion, culminating in a streptococcus septicemia. A review of the literature indicates that this is by no means an isolated observation. A 5 per cent. collargol solution is thus not efficiently bactericidal and the utmost pains must be taken, during the catheterization, to avoid any lesion of the urinary tract.

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HEXAMETHYLENAMINE AS A URATE SOLVENT.—Hanzlik (*Jour. Lab. and Clin. Med.*, 1916, No. 5). A review of recent investigations, on the action of hexamethylenamine, indicates that its power as a urate solvent is practically nil, at least in therapeutic doses. Even when given in excessive amounts, its action along this line is less than that of the old-fashioned alkaline diuretics, which themselves are inefficient enough.

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UNILATERAL HEMATURIA.—Ransohoff (*Surg., Gyn. and Obstet.*, 1916, No. 3). A case of unilateral hematuria had features of unusual interest. At operation, a large pancreatic cyst was found which, by pressure upon the renal vein, had produced the hematuria. The latter disappeared after the operation. So far as the author has been able to discover, the case is unique.

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TREATMENT OF STERILITY IN WOMEN.—Fellenberg (*Correspondenz-Blatt fuer schweiz. Aerzte*, November 6th, 1915). In some cases of female sterility, it would appear that the trouble is due to faulty internal secretions. On account of the close relationship between the thyroid and the genitals the writer was led to try the administration of thyroid in cases of sterility without apparent cause. In a number of cases conception followed. Good results were also observed from the use of thyroid in cases of habitual abortion. The patients subjected to this treatment must be kept under close observation, with frequent blood counts.

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MILD DIABETES IN CHILDREN.—Riesman (*Amer. Jour. Med. Sc.*, January, 1916). There exists a mild type of diabetes in childhood and adolescence which is peculiar in its tendency to occur in several members of the same family. The glycosuria usually is moderate, although nervous excitement and other disturbing factors may augment it. Other diabetic symptoms often are slight and may be wanting. The disease is not progressive and may remain stationary or end in apparent recovery. In its general features, it corresponds to the so-called renal diabetes.

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## EDITORIAL.

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### THE MIND OF WOMAN.

In one of his books Thackeray says, "It's a good wife who laughs at her husband's jokes," and elaborating on this witty remark we moderns would be justified in saying that it's a good wife who thinks well of her husband's mentality and even finds him intellectual. Now without delving too deep into the domestic affairs of Mr. and Mrs. Havelock Ellis, it can be said with considerable assurance that theirs is a happy household in so far as Mrs. Ellis has repeatedly told her husband that his jokes are good and that his intellect is also good. We infer this must be the case, otherwise Mr. Ellis would not have written in so mildly a complimentary strain on the subject of the "Mind of Woman" in the *Atlantic Monthly* for September, for even a mild compliment when paid to the opposite sex is a condescension on the part of a male student of the mind feminine. Not that we think the female article of mentality should invite our extravagant praises; it has its virtues and defects; it is disappointing at times and surprising at times; and it should be dealt with viciously or in a manner to assure the reader that its qualities are of the worth and value of its male congener. But Mr. Ellis, being happily married, and, as we have already said, perhaps the daily recipient of compliments from his wife, is kindly disposed to the mind of woman, not in a very enthusiastic way, but in a quite lackadaisical way, so that neither his wife nor the wife of any other man can say aught that would show Mr. Ellis to be antagonistic to the commanding qualities of the feminine mind. We would have preferred a brutal and vicious attack to his mild words; we would have preferred an adulatory attitude; for either would have given us a peg upon which to hang an argument. And it is because of the conciliatory tone

of the article and the absence of a spirit of acrimonious criticism or excessive praise that we condemn Mr. Ellis's lucubration on this very interesting subject.

Mr. Ellis is at a loss to explain why genius has a preference for building its nest in the male and rarely seeks a home in the female. Perhaps if he had read Otto Weininger's masterpiece, "Sex and Character," he would not have been in such a decided quandary to decide the reasons, for the German philosopher and student of mankind has a solution of the problem that appeals to one at once. If George Sand, George Eliot and Mary Somerville were geniuses—and there is no doubt they were—the ten percent., or twenty percent., or thirty percent. of masculinity applies to them; and Weininger is right when he says that without this beneficent addition their genius would have been lacking. And he also says that there are no masculine men in the world and no feminine women in the sense that the male has no feminine characteristics and the female no masculine characteristics. And this being so, is it not possible to explain talent in women and genius in women by assuming that both these gifts are dependent on the male qualities given them by some freak of nature? But how explain the genius of Chopin, of Alfred de Musset, of Lamartine and others, whose works have the stamp of genius, yet whose mentality indicated a goodly quota of feminine qualities? Even the German philosopher stops short at an explanation of these phenomena.

The mind of woman has been subjected to all manner of criticism and has come atop of the seething cauldron to defy another attack. The male has pointed out its decided limitations, and especially is this so when the male happens to be a gynecologist or a nerve specialist. But the hysteric male is an entity whose irruptions into our social life are not infrequent, and the male, who makes a sorry mess of his life through mental parts that are lacking in good and stable qualities, has been heard of, too. These derelicts we thrust into the class of the men *minus*, but in doing this, do we ever take cognizance of the fact that perhaps their percentage of feminine qualities preponderated over the male equivalent? Has anyone been courageous enough to accuse the derelict that for some unfortunate reason he inherited qualities from his mother which his judgment in after years should have suppressed? No; in our cowardly way, though never forgetful of a veneer of science, we have persisted in saying and writing that drink and smoking and other vices, not to mention overeating, have been the cause of the deterioration of our race, when a little thought would have fastened the crime where it really belongs—on the preponderance of feminine over masculine mental traits!

P. S.



## BOOKS AND AUTHORS.

Miss Agnes Repplier is a well-known essayist and Miss Agnes Repplier lives in Chestnut Street, Philadelphia. We make mention of the latter fact because when reading her latest volume of essays, "Counter-Currents" (Houghton Mifflin Company, Boston and New York), her point of view should not be too severely criticized by those who do not live in neighborhoods of the dignity and security of Chestnut Street, Philadelphia, or by those who having lived in such neighborhoods have moved away so as to get in touch with the common (?) people. Now if the reader will always remember this, he will not be irritated by the many bright and clever things she says, nor will he cast the book aside after a superficial perusal with the remark that, clever though it be, the attitude of the writer is so decidedly prejudicial to advances as we moderns understand them that little benefit can be derived from a serious study of its contents. This would be a great loss to the reader, for all the essays are worth while and all have the glamor which extreme cleverness bestows even on second-rate writings. While not a deep thinker, Miss Repplier is so keen an observer, her perspicuity is so dependable, her mind so alert for the detection of our many weaknesses, that many avenues of thought are opened up for us, avenues in which we have allowed the weeds to choke some very fair flowers. And it is on account of her keenness of intellect that we are drawn into the net and held there despite our efforts, every now and then, to extricate ourselves on account of her narrow point of view and her stubborn opposition to our modern strivings. The essay that best illustrates the virtues and defects which we have just mentioned is the one on "Popular Education"; and while we smile at what her caustic pen writes and applaud her many witticisms, we are constantly irritated by her detection of some of the minor faults of modern education and their magnification into a plea that shall do away with all our advanced efforts. This mood of ours is with us constantly while reading another essay—"The Modest Immigrant," for therein her prejudices run amuck; and though again we applaud some of the things she says, we feel that her coign of vantage is again Chestnut Street, Philadelphia, and are sorry it is, because it spoils an otherwise very good and clever essay. "The Modest Immigrant" is, according to Miss Repplier, a rather bold and immodest product, who is unwilling to get under the yoke of the sort of Americanism that would best benefit him and this country; and she thinks him so because he is a foreigner. Perhaps she is right; but where she is decidedly wrong is when she writes that even his children and grandchildren will be just as obstreperous. Now Miss Repplier comes of Huguenot stock that wandered hitherwards not so many years ago; but would anyone in his right mind bring the charge against her that on account of her grandfather having been a Huguenot she is not a good American to-day? We hardly think so.

But if we criticize somewhat severely some of her essays, we have nothing but praise for the masterpiece of the book—"Waiting." In this essay the leash that holds Miss Repplier taut to a narrowness of outlook, as illustrated in the essays which we have mentioned, is completely rent asunder, and the result is that we

have a *tour de force* that sweeps us off our feet and makes us acclaim her a leader in discursive writing. Whether one is for or against the policy that has been pursued in this country in the matter of waiting for another note from Germany to clear up a tangled matter that seemed beyond solution, will have no bearing on one's appreciation of the brilliant qualities of this essay, and of the trenchant manner of presenting facts that must appeal to all Americans, seasoned with a wit that takes the edge off some of the statements, but at the same time lubricates them so that they are driven home with greater surety. P. S.

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When one is accustomed to a certain author's style of writing and then all of a sudden that author changes it, it is difficult to adjust one's point of view so as to do justice to the change. In the case of Mr. Stephen Leacock we were well satisfied with his old style, for he had given us some delightful hours with his humorous books and he had held us in his thrall by the brilliancy of his mind. "Nonsense Novels" swept us into a state of enthusiasm for this Canadian humorist who had a gift of taking the modern novel and showing us its utter absurdities; "Behind the Beyond" made us really ashamed of our admiration of the Norwegian dramatists and their followers in England by a parody that was so nearly like the original manner of writing in these modern plays that we marvelled how we could ever have read them and not seen their ludicrous situations; "Moonbeams From the Larger Lunacy" and "Arcadian Adventures With the Idle Rich" were a mine of inexhaustible pleasure to us. In brief, we hailed each work of Mr. Stephen Leacock,—staid professor by profession but humorist by reason of his undoubted talent,—as something to give us pause, and even our favorite Mr. Dooley could not take us out of our seriousness so effectively as could the Canadian humorist. And now we have before us a new manner of writing from this author, a book of essays and studies the exact title of which is "Essays and Literary Studies" (John Lane Company, New York). Were we to write that we are disappointed we would be stating an untruth, for though the old Leacock style of writing is absent and a serious tone is effected, the good qualities of the book are a commendable feature. Here are sober writing, a number of incisive remarks, a touch here and there of originality, a critical attitude that indicates much thought and a wide knowledge of the subjects discussed. But though we cannot withhold praise where praise should be given, we are candid enough to confess that literary criticism is not Mr. Leacock's *metier*. His literary gift lies in an altogether different sphere, and anyone possessing this gift should be content to exploit it. And we are bold to say this in face of so excellent an appreciation as is "The Amazing Genius of O. Henry," an appreciation that shows Mr. Leacock at his best as a critic and also at his best as a man of originality, for can it be gainsaid that to speak of O. Henry's genius as 'amazing' is not original? The dormant American critics who have mildly praised O. Henry in the past should arouse themselves long enough to read every word of this splendid tribute, not once but many times, so that burned into their memory will be the judgment of one who knows whereof he speaks. P. S.

## ORIGINAL ARTICLES.

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### THE EPIDEMIC OF 'STREPTOCOCCIC GRIPPE' AND ITS RELATIONSHIP TO SCARLET FEVER.

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By M. G. WOHL, M. D., AND A. K. DETWILER, M. D., of Omaha.

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Since the beginning of last September and until now, the so-called 'grippe' has affected hundreds of people in Omaha and vicinity. A similar epidemic occurred in Chicago, Philadelphia and other cities in this country. All classes of people, irrespective of age, sex, environment and social position were victims of the epidemic.

The clinical picture of this epidemic is very different from the true 'la grippe' of 1889 and succeeding years. While true influenza had little effect upon young children,<sup>1</sup> the present epidemic affected all ages equally, adults being as frequently victims of the condition as the younger people, the ages being illustrated by Table I.

TABLE I.

Age	No. of cases
5 .....	2
7 .....	3
9 .....	2
12 .....	2
15 .....	1
18 .....	5
19 .....	1
21 .....	1
22 .....	1
23 .....	7
35 .....	1
37 .....	1
44 .....	3

The condition begins with a sore throat, varying in severity from a slight infection to a severe tonsillar inflammation and pharyngitis.

NOTE.—This paper was received for publication February 21st, 1916.



In most of our cases, the throat presented a red, dry appearance, not unlike the angina of scarlet fever. The onset is sudden, marked by nausea and less frequently by vomiting, chill, high fever with its accompanying phenomena, headache, prostration, etc., as shown by Table II.

TABLE II.

Symptoms	No. of cases
Nausea .....	30
Vomiting .....	15
Chill .....	12
Fever .....	30
Headache .....	30
Prostration .....	30
Angina .....	30
Adenitis .....	15

Extension upward to the nose, its accessory sinuses and ear, or downward to the larynx, trachea and bronchi frequently follow. In 50 per cent. of our cases an involvement of the cervical glands occurred, which in 2 cases went on to suppuration. Smears and cultures from the glands revealed the same offending micro-organism as found in the throat of the patients previous to the suppuration. In 7 cases of the series studied there was ear involvement, in 2 cases pneumonia, and 10 cases developed a nephritis from ten days to two weeks after the onset of the 'grippe.' These complications are shown in Table III.

TABLE III.

Complications	No. of cases
Ear .....	7
Pneumonia .....	2
Nephritis .....	10
Suppurative Adenitis.....	2

In more than one-half of our cases, there was a recurrence, which usually was more severe than the first attack. In 4 cases with a recurrent attack, we used an autogenous vaccine from germs isolated from throat, and recovery was more speedy than in the recurrent cases not treated with vaccine.

*Bacteriology.*—The bacteriology of the upper respiratory passages was studied in 30 cases. Cultures were obtained from the throat, nose and the sputum. The culture media employed consisted of Loeffler's blood-serum, glucose agar, blood agar and bouillon; various methods and different media were used from time to time for isolation and identification of the germs. The greater part of the cultures were grown aerobically, and only few

anaerobically. In all cases thus studied we found the streptococcus as the predominating factor. Upon glucose agar they appear as small white transparent colonies; upon blood agar the zone of hemolysis extends for about 1 mm. in diameter. Gelatine is not liquefied; litmus milk turns red and curdles. This latter characteristic was marked in some, and rather slight in others. In bouillon the cloudiness is irregular, with the upper parts clear, while at the bottom there is granular matter.

A point which is of considerable interest to us is, as mentioned, the slight hemolysis upon blood agar. This characteristic was also true of streptococci isolated from the scarlatinal angina, as described later. Stained smears of the cultures show Gram positive streptococci, which are in long chains, but some are mixed with Gram positive diplococci and smaller chains. Whether the long chains would explain the virulence of the infection cannot be stated definitely, for as is well known the length of chains can be altered by using different culture media. Streptococci were found in pure culture in 12 cases.

TABLE IV.

Streptococci in pure culture.....	12 cases
Streptococci and staphylococci .....	8 cases
Streptococci and pneumococci. ....	3 cases
Streptococci and diphtheroids .....	2 cases
Streptococci and diphtheroids and pneumococci.....	5 cases
Green producing streptococci were found in most of the cultures.	

In 10 of the cultures there was present a bacillus the size of the colon bacillus, which had a tendency to group in pairs and was Gram positive. This is at present being studied more fully. The finding of the streptococci was so constant that we cannot help believing that the present epidemic of so-called 'grippe' is of the streptococcic origin, and for want of a better term we would call it 'streptococcic grippe.' Not in a single instance have we been able to isolate the bacillus of Pfeiffer. Our bacteriological findings are somewhat in accord with those of George Mathers,<sup>2</sup> from a similar study of the epidemic in Chicago. In none of the cases studied did we find an eruption of the skin, but the symptom-complex, sore throat and fever, nausea, and in some cases vomiting, brought to mind scarlatina sine eruptione, for as Osler<sup>3</sup> states, more than one-third of scarlet fever cases have no rash.

Within six weeks after this epidemic began, we commenced to see cases of exactly similar nature with sore throat and fever, but accompanied by a scarlatinal rash. In six families, we found one or two persons with the simple streptococcic grippe and one or two members of the same family with scarlatina. In four families we found one case of scarlet fever, and the other members of the family

affected with the epidemic streptococcic grippe. In connection with this, we might mention the well-known fact that many nurses caring for scarlet fever patients acquire a streptococcic sore throat. The reports of vital statistics show that Omaha is not alone in the parallel incidence of these two epidemics. In Chicago there was a great increase in the number of cases of scarlet fever as compared with the preceding year.

#### NUMBER OF CASES OF SCARLET FEVER IN OMAHA.

	1914	1915	1916
September .....	2	62	
October .....	2	64	
November .....	2	69	
December .....	7	146	
January .....		13	331

The simultaneous occurrence of these cases and the close clinical relationship to streptococcic fever suggested a common etiological factor for the two.

The striking feature of the present epidemic of scarlet fever is that adults are as frequently affected as children. The symptoms bear close resemblance to those of streptococcic fever as in Table II, except they are more severe and the rash is present in all of them.

The bacteriology of the upper respiratory passages of 27 cases has been studied along the above lines, and in all we found a streptococcus of the same description as that found in streptococcic grippe in great predominance as follows:—

TABLE V.  
Scarlet Fever 27 Cases.

Pure streptococcus .....	19 cases
Streptococcus and staphylococcus .....	4 cases
Streptococcus and pneumococcus .....	1 case
Streptococcus and diphtheroids .....	1 case
Streptococcus pneumoc. and diphtheroids.....	2 cases
<hr/>	
27 cases	

In five cultures we found a long spore bearing aerobic Gram positive bacillus, an acid producer, with a heavy moist growth on dextrose agar (*Bacillus Subtilis*?). In regard to the immunity reactions of the streptococcus, we found that serum from convalescent cases of streptococcic fever would agglutinate streptococci of scarlatina grown in 1 per cent. dextrose bouillon plus 1 per cent. calcium carbonate, in higher dilutions than those of streptococcic fever. Serum from cases of scarlet fever would agglutinate streptococci of the



epidemic fever as well as scarlatinal streptococci in similar dilutions. The usual macroscopic method was employed, test-tubes placed in incubator for two hours and then left at room temperature for six hours and reading made; controls were made without serum.

TABLE VI.

## Agglutination of Streptococci.

Serum (Miss K.) Streptococcic Fever.

1:640 Scarlatinal Streptococci—Positive.

1:80 Epidemic Fever Streptococci—Positive.

Serum (Mr. H.) Scarlatina.

1:160 Streptococci of Scarlatinal Angina—Positive.

1:160 Streptococci Streptococcic Fever—Positive.

1:640 Streptococci from Felon—Positive.

Serum (Dr. L.) Streptococcic Fever.

1:320 Scarlatinal Streptococci—Positive.

1:60 Epidemic Fever Streptococci—Positive.

Serum (Mr. N.) Scarlatina.

1:80 Streptococci from Scarlatinal Angina—Positive.

1:60 Streptococci from Streptococcic Fever—Positive.

1:640 Streptococci form Felon—Positive.

Apparently this would indicate that we are not dealing with a new strain of streptococci. Agglutination for differentiation of streptococci was done by a number of men. Although Moser and von Pirquet<sup>4</sup> and Salge<sup>5</sup> found that there is a distinct biologic relationship between scarlatinal streptococci and serum from scarlatinal patients, yet on the other hand the work of Aronson,<sup>6</sup> Neufeld,<sup>7</sup> Weaver,<sup>8</sup> and our own experience would indicate that agglutination is in no way specific and cannot be relied upon for differentiation of streptococci. We are now carrying out Gordon's fermentation test,<sup>9</sup> and also the anaphylactic phenomena as suggested by Davis,<sup>10</sup> to differentiate the streptococci. At present, however, we must admit that there is little difference between streptococci as a class. It is rational to assume that the non-hemolytic streptococci, which normally inhabit the throat, undergo a rapid mutation, and under certain conditions assume pathogenic properties of varying degrees. In one individual they may cause simple angina of the streptococcic fever type, and in another pave the way for the hypothetical specific virus of scarlet fever, because if there is a virus, it lives in symbiosis with the streptococci. That streptococci are a constant finding in scarlatina has been demonstrated by Frankel and Freudenberg,<sup>11</sup> D'Espine and Marignock,<sup>12</sup> and Baginsky<sup>13</sup> and others who found them not only in the throat but also in the blood, cerebrospinal fluid and bone-marrow of cases not ac-

compañied by septic complications. In our few cases studied the streptococci were found in pure culture in nineteen instances, and although no sufficient proof has as yet been furnished for streptococci as the prime etiologiçal factor of scarlet fever, it is equally true that no basic argument has been given against it. Why, in one individual the streptococci would produce streptococcic grippe and in another the complete picture of scarlet fever, can readily be understood if we take into consideration the phenomenon of bacterial anaphylaxis. If an animal is injected with a foreign protein, egg albumin, blood serum or bacterial protein, the animal is rendered hypersensitive to this particular protein or to its biologically or chemically related proteins.<sup>14</sup> After an incubation period of eight to twelve days, the introduction of a second dose of the same or a related protein causes the production of a train of symptoms (anaphylaxis) which differs with the species. In man it is best illustrated by the well-known picture of serum sickness: rash—erythematous or urticarial; nausea and vomiting; albuminuria and edema; joint symptoms.<sup>15</sup> These symptoms vary with the nature and quantity of the protein, the path by which it is introduced, as well as the interval between administrations. This would probably explain the variations in the symptoms of scarlet fever.

That streptococci can produce a rash has been shown by Sir James Paget, in 1864,<sup>16</sup> who demonstrated an erythematous eruption, occurring during septic infection, puerperal or otherwise. The complications of these are almost indistinguishable from those of scarlet fever.

Kogan<sup>17</sup> during the vaccination of 62 children with streptococcus vaccine, observed fever of varying degrees in all cases, angina and exanthemata in 9 cases and vomiting in 2 cases. The instance recorded by Krumweide,<sup>18</sup> whose assistant developed all the classical symptoms of scarlatina after swallowing a suspension of streptococci, although there was no contact with scarlet fever, is a striking argument for the above assumption.

Our cases studied are too few to draw definite conclusions, yet we feel, that some, if not all, of the symptoms of scarlatina, such as rash, fever, eosinophilia, are of direct streptococcic anaphylactic origin.

The work of Kretschmer bears out this statement.<sup>19</sup> Whether or not beside this, there is a specific virus of scarlet fever, either a filterable virus or the cyclaster scarlatina or the new bacillus of Mallory,<sup>20</sup> which must grow in symbiosis with streptococci, remains problematical.\* For practical purposes, however, we must admit

\*After our article went to press Mallory and Medlar report the finding in the throats of scarlet fever cases (*Jour. Medical Research*, Boston, March, 1916, Vol. XXXIV, No. 1, a strongly Gram positive bacillus which they believe to be its cause. Further corroboration, however, is needed before the work can be accepted. We found a somewhat similar bacillus in our cultures from 10 cases of the grippe.

that the streptococci play the most important rôle in the clinical entity called scarlet fever.

Once this is realized, proper attention to the destruction of the streptococci, either locally by disinfection of discharges from the nose, throat and ear, or by raising the constitutional resistance against them by vaccination, would certainly lessen the incidence of the disease. Desquamation in our opinion is not specific, but is an accompaniment of the specific toxic anaphylactic dermatitis.

That true scarlatinal rashes may occur in serum sickness and be indistinguishable from scarlatina, although followed by less definite desquamation, is well known, and is one of the greatest sources of trouble in hospital practice where it is necessary to differentiate them from true scarlet fever.<sup>21</sup> We are likewise inclined to look upon the desquamation as not infectious, unless it becomes contaminated with discharges from ear, nose or throat. The Report of the Metropolitan Asylum's Board of London<sup>22</sup> bears out this statement, since they found that in 52 per cent. of the cases, a morbid condition of the nose was the lesion associated with the return case. That this stubborn rhinitis with its streptococci is infectious was laid stress upon by Kerr,<sup>23</sup> and there is no doubt but that if this septic infection is removed, either the entire causal agent of scarlet fever will be done away with, or at least the symbion of the unknown hypothetical virus removed, without which it cannot exist. The work of Gabritschewsky,<sup>24</sup> and his other Russian associates, in immunizing with streptococcic vaccine the children exposed to scarlatina, is conclusive that it has a decided value from a prophylactic standpoint. A number of his fellow countrymen pursued a study along these lines, although but few have taken up the matter in this country.

Smirnof<sup>25</sup> observed that of 91 unvaccinated children 37.3 per cent. developed scarlet fever, and of 127 vaccinated children 3.93 per cent. developed it. The protection by repeated injections is shown by the following table.<sup>26</sup>

Vaccinated	Cases	Incidence
Once	1,295	1.69
Twice	1,018	0.19
Thrice	256	0.00

Kogan<sup>27</sup> reported the vaccination of 62 children in an asylum during an epidemic of scarlet fever. The children remained immune from 1908 to 1911, when a new epidemic broke out, and of these 62 vaccinated cases, only 2 contracted scarlet fever, or 3 per cent., while out of the 26 new non-vaccinated cases admitted to the asylum, 8 contracted the disease or 30+ per cent.

Waters<sup>28</sup> reports the successful immunization of nurses with streptococcic vaccine. Of these vaccinated, only 2.7 per cent. con-



tracted the disease, while of the non-vaccinated 35.7 per cent. acquired the disease.

#### CONCLUSIONS.

1. The present epidemic of so-called 'grippe' is of streptococcic origin and should be called 'streptococcic grippe.'

2. The concomitant epidemic of scarlet fever bears a direct relationship to it.

3. Whether or not the entire clinical entity of scarlet fever is a manifestation of streptococcic anaphylaxis, or whether the streptococci are the essential factor for the symbiotic growth of the hypothetical virus, is, for practical purposes, immaterial.

4. Immunization with streptococci from scarlatinal angina for prophylactic purposes is scientifically justified and practically of sufficient importance to warrant its wider application.

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## THE INFLUENCE OF GASTROPTOSIS ON GASTRIC SECRETION AND MOTILITY.

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Various views have been expressed by different well-known authors, in regard to the effect of ptosis of the stomach on its secretion and motility, which show, in general, that a confusion exists between the true condition of prolapsed stomach and the accompanying myasthenia which are not always present at the same time.

Riegel, for instance, expresses the opinion that gastroptosis may eventually show motor disturbances; in other words, a difficulty in driving the contents through the pylorus. Much less often, in his opinion, are disturbances of secretion to be found. When they occur, they are much more liable to be an accompaniment of the stomach's position than the direct result of it.

Boas believes that with the descent of the stomach there is often a loss of the elasticity of its walls. Necessarily, however, according to him, there does not invariably exist an accompanying myasthenia, while only in very advanced cases does the stomach's power become insufficient for an ordinary meal. As far as the secretion goes, he declares that all variations are found, which can possibly exist, and hence this function of the stomach bears no relation to its position.

Rosenberg has proved that in 20 per cent. of all cases, gastroptosis is associated with hypermotility; in 10 per cent. the motility is normal, and in 70 per cent. hypomotility exists.

Zweig regards the changes in motility as more dependent upon the accompanying nervous dyspepsia than upon the change of position of the organ, and in addition, considers that the changes in secretion are typical results of the nervous dyspepsia.

In our work, the determination of gastroptosis was made in two distinct ways. In the first place, where we had every reason to believe that the ptosis was congenital, since it was found usually in young adults, the radiogram was depended upon to determine the position of the stomach, since the visual contour and the percussion outlines were less readily made out. When, however, the change of position of the organ was acquired, as is so frequently found in women who have borne children, and as the result of laparotomies, succussion occurring far below the normal limit of the lower border,

that is the navel, and the visible contour of the stomach, which on side view of the patient, prone upon the table with a good light, can be detected as a convex curve below, running across the abdomen from left to right and a concave border above, lying usually between the navel and the costal arches were largely relied upon for the establishment of the position of the stomach. When these borders could not be made out readily by inspection, the patient was given an effervescent mixture, and determination of the outlines by vision was augmented by direct percussion and by auscultation.

The detection of succussion alone, though regarded by many as proof of the change of position of the stomach, because when lying, under the costal borders this sign cannot be elicited, was never regarded as significant because of the various physiological positions of the viscus.

The study was made upon 127 women of the poorer class, many of whom had borne from six to fourteen children, and who had usually confined their stay in bed after labor from two to five days.

Our method of determination of gastric secretion was by means of the Carlson water meal, which has been demonstrated in our hands, by comparison in the same patient, to be fully equal to the Ewald meal. 250 c.cm. of faucet water were given the patient fasting, and twenty minutes afterward the gastric content was withdrawn, with the patient in a sitting posture, without aspiration, with a Jacques tube 11 mm. in diameter. Free hydrochloric acid was determined by Topfer's reagent as an end reagent and the total acidity was determined as usual by phenolphthalin. The acids were expressed in the usual manner—in totals of the amount of tenth normal sodium hydroxide, for 100 c.cm. of gastric content. With the employment of this method, we have found that while the acids are always much less than with the Ewald meal, the ratio always remains the same. In other words, if the patients on the Ewald meal show high acidities with that stimulus to gastric secretion, they will also show high acidities with the water meal.

The grosser degrees of insufficiency of the stomach were determined by the use of the evening meal of bread, potatoes, meat, butter, rice, and raisins, and the search for food remnants, particularly rice, in the content removed after the water meal, which was permissible, since the patients came to the clinic fasting. The lesser forms of gastric motility were determined by the addition of 10 drops of a watery solution of chlorophyll to the water given, which was found to leave the normal stomach in the chosen period of twenty minutes, and content withdrawn at the end of that time was colorless, unless there was an admixture of bile.

In every case where residue was found, the presence or absence of starch was determined after the supernatant liquid had been poured off, by the addition of Lugol's solution, with which the



chlorophyl, even if present, did not appear to interfere. The confusion of chlorophyl with the possible presence of bile was always avoided by underlying a portion of the content with nitroso-nitric acid, which gave the characteristic reaction of bile pigments, if bile was present.

But little dependence was placed upon the total amount withdrawn to determine the grade of motility, because of the well-recognized difficulty of emptying the ptosed stomach completely with the tube, perhaps on account of its low lying position and possibly on account of the associated myasthenia in certain limited instances.

As emptying the ptosed stomach is dependent both on gravity and the resiliency of the stomach walls, it ought to be encouraged by the prone position. Efforts were made in this attitude to increase the amount of content withdrawn, but never with success. Among the total cases examined (127) there were found 34 gastroposes, an average of 27.6 per cent. This large number of ptoses was dependent upon the fact, as stated, that many of the patients had borne several children. Whether this average is greater than would be found in other clinics of a similar character, we cannot say.

The acidities which were found in the total series averaged in round numbers 17 and 26, which indicate the free hydrochloric acid and the total acidity. The average of acidities of those suffering from gastroposis was 12 and 20. These amounts, as can be readily seen, are distinctly less than those of the total series; hence, we may safely draw the inference that the total secretion is diminished where gastroposis is present.

Before giving these values full significance, however, we must also take into account the total amounts withdrawn, which for reasons stated are less accurate, because acidities are really only percentages based upon a volume whose quantity is usually unknown. Were there considerable retention of the gastric juice, the relative amount of acid would naturally increase, so that if we found increased acidities in the cases of ptosis with lessened amounts, the latter factor might account for a relative increase, rather than a hypersecretion. For this reason, we have made an attempt to compare the amounts of the total series with those of the gastroposes: the former group gave an average total of 34 c.cm., while the latter gave an average of 30 c.cm., so that the lessened acidities in the latter are not dependent upon the total amount of fluid.

With reference to the milder degrees of insufficiency, there were 61 instances in the total group, or 48 per cent., where chlorophyl was present in the removed content, while in the smaller group, consisting of 34, there were 14 cases, or 41 per cent. This would

tend to show that there could be no marked impairment of motility in the ptosed stomachs.

When we come to consider the food remnants, we find that in the total group there were 11 instances of stasis, or a percentage of 8.6; in the smaller group with 34, there were three instances of food remnants in the stomach, amounting to 8.8 per cent. Hence, we can readily see that both from the chlorophyl test and the remnant test in fasting stomachs, there is no evidence of either greater or lesser impairment of motility.

Gastroptosis is sometimes said to be associated with mild gastric catarrh, so that it seemed worth while to make careful note of the cases where gastric mucus was present. We find, then, that in the total of 127 cases, there were four in which gastric mucus was found, or 3.1 per cent., while of the 34 gastroptoses, 2 had gastric mucus or a percentage of 5.8.

Hence, from the increased frequency of gastric mucus in the latter, we may conclude that mild gastric catarrh is somewhat more frequent, though the difference is so small that it may be accidental. In connection with its detection, we would say that differentiation of oral from gastric mucus is determined by the fact that the gastric mucus is separated from the other by sedimentation, since the oral rises to the top of the fluid, and also by the use of staining with brilliant green, which colors the oral mucus and not the other. Apart from the slight impairment of secretion, little was found to distinguish the gastric functions of the sufferers of ptosis from those of so-called gastric neurosis or nervous dyspepsia, without change of position of the organ, from which the remainder largely suffered, as we included none of those having actual organic disease. The symptoms were often markedly similar—namely, belching and pressure after food, which was often dignified by the patient with the term ‘pain and constipation.’ Apparently, there was something in common between these groups. As many a stomach beside a ptotic one slopes, and has exactly the same symptoms, we must ascribe it to a myasthenia, which is not necessarily congenital, nor yet pronounced enough to cause insufficiency in the propulsive efforts of the organ. On the other hand, we recognize many instances of ptosis without succussion and without gastric symptoms.

We may, as many do, ascribe this difference in sensations produced, and lack of them, to the vegetative nervous system, which has some ground, because the opposite condition, known as vagotonus, produces spasm sufficient, so it is claimed, to imperil circulation in end arteries. Another argument in favor of this explanation is that symptoms may disappear, and still physical examination show the same condition of the stomach. Hence, relief from this condition must always be regarded as relative, and a possibility of its return always borne in mind.

The old view that gastropptosis is accompanied by insufficiency, and the consequent delay of food in the stomach by hypersecretion, is not confirmed by these results, and one can only wonder whether they were not theoretical.

Our views with regard to the behavior of the gastric secretion in gastropptosis agree closely with those of Brown, who in forty instances, found a diminution of the free hydrochloric acid, which, whenever a dilatation accompanied it, was much more pronounced.

Steele and Francine also agree that the examination of the gastric content in gastropptosis shows nothing abnormal. In many cases, however, the hydrochloric acid was much diminished and often absent.

With regard to the association of symptoms in gastropptosis, our results also agree with those of Knudfaber, who found that a marked gastropptosis, as determined by the *x*-ray examination, might continue without any symptoms whatever. The majority of them, however, were accompanied by distinct symptoms, while there was no correspondence with the grade of ptosis and the severity of the symptoms. Those who suffer from gastropptosis following numerous births, accompanied by lax abdominal walls, are especially free from such manifestations of the condition. His impression is that ptosis as such, does not produce the symptoms, but renders the sufferer more disposed to gastric discomfort. On the contrary, he found that even in those without symptoms, the motility of the stomach in many was very much impaired and its emptying was delayed from one to two hours beyond the period when it should have been free from food. When this delay occurred, the patient was often plagued with attacks of cardiospasm and dyspepsia. In the severest cases, food was retained three hours beyond the normal limit.

Our own results, in conjunction with the consensus of opinion of others, show the following conclusions:—

1. That gastropptosis may exist without symptoms and without any changes in motility or secretion.
2. That the symptoms and changes in secretion and motility do not conform in any way to the degree of ptosis.
3. That in the majority of cases secretion suffers, in that a diminution more often occurs while motility is much more rarely affected.
4. That the changes in secretion and the presence of symptoms seem to be due not so much to the altered position of the stomach as to nerve influence of central origin, *i. e.*, vagotonus.
5. That while by treatment we often relieve symptoms, we rarely restore the stomach to its normal position, nor do we modify in any way the altered secretion.



## ENDEMIC ENDAMEBIC DYSENTERY.

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This small series of cases of endamebic dysentery is presented to emphasize its occurrence in Missouri, and to report the results of its treatment with the alkaloidal emetine hydrochloride.

In 1902, Myer<sup>1</sup> reported 2 cases of endamebic dysentery, and briefly reviewed the literature of the disease. At that time he found the reports of only 200 cases in the United States, and these chiefly from southern and seaport towns. This was only twelve years after the report of the first case by Osler in 1890. In 1909, Patterson<sup>2</sup> reviewed the geographic distribution of the disease in this country, and found frequent reports from such inland states as Illinois, Michigan, and Montana. However, the coast cities were still the origin of most of the case reports. Cases have been located geographically with regard to the place of origin of the report rather than to the place of origin of the disease, and with the present ready means of travel this is a great error in the study of its epidemiology.

Myer mentions a series of 10 cases seen at the St. Louis City Hospital within the eight months preceding his report. Six of these cases died and 4 recovered. Three cases were complicated with hepatic abscesses. These cases were later reported by Nietert.<sup>3</sup> He noted the geographical site of origin in only one case and this was the Philippine Islands. Speaking of these cases and the two of his own report, Myer says: "These are the only ones recently reported in this city. Whether they were the only ones existing here, or whether others were unrecognized, I cannot say. I am inclined to the latter belief. If, therefore, I reiterate much that has been observed before, it is with a view to calling attention to a disease that is in all probability more common in this locality than has hitherto been supposed."

In 1913, Myer and Cook<sup>4</sup> reported 6 cases seen during the preceding six years, in which ipecac in salol-coated pills was used. In one of these the disease developed during a stay in Mexico, and, I am able to say, this case has to date had no recurrence. The geographic distribution of the other cases was not reviewed.

The few cases in this brief series are of great interest in view of the evident local origin of the infection in a part of them, and I think they raise the question as to whether or not the disease may

not be becoming more common locally. They were found among approximately 1,000 cases at the Gastro-Intestinal Clinic of the Washington University Dispensary, during fifteen months. Perhaps the discovery of these cases is merely because of a more diligent search for an etiological factor in a diarrhea and colitis symptom complex. However, in several of these cases a search was unnecessary. The diagnosis could be strongly suspected from the history.

In considering the geography of the disease, its occurrence in any locality under the present conditions of easy travel does not indicate that the disease is endemic to that locality. In several of the cases here reported the geography of the individual case is quite absolutely restricted to St. Louis or at most to the State of Missouri. This must either mean that the disease has gained a foothold here, or that these persons were infected with imported foods.

The treatment of endamebic dysentery in the past has included all those measures and agents common to all diarrheic conditions. Since ipecac was first determined to have a specific action upon the infection, it has been used by oral administration in salol-coated pills, and the injection subcutaneously or intramuscularly of the alkaloidal principle, emetine. Also, local irrigations with emetine and other substances have been used. The treatment of the cases in this series has been limited to the use of ipecac and emetine preparations, to moderate dietetic restrictions and to the symptomatic relief of local rectal conditions. The aluminum silicate ipecac tablets have been used; also the injections of emetine hydrochloride subcutaneously and intramuscularly. The injections in all cases produced more or less local soreness. Later I adopted the intravenous method of administration, using one grain doses. The avoidance of the soreness caused by the subcutaneous or intramuscular injections is a great relief to the patient. It is also evident that the drug is more effective by intravenous injection, perhaps reaching the tissues in greater concentration.

CASE I.—M. C., *æt.* thirty-eight, white, female, married. She complained of diarrhea, griping, and a marked loss of weight. She had been sick for twenty months constantly, growing worse, especially in the previous four months. Pain was diffuse over the lower abdomen, constant, worse at night, and was characterized as colicky and relieved by defecation. She had from twenty to thirty stools each day, very small amount, chiefly blood and mucus. She could not state the entire loss of weight. She weighed 126 lb. She was very nervous and exhausted.

*Physical Examination.*—Slender asthenic type, moderate emaciation. Moderate pyorrhea. Abdomen: muscles tonic; no rigidity; no fat. Liver, from the sixth intercostal space to 2 cm. below the costal margin, and consistency unaltered. Tenderness to pressure low in both iliac fossæ. Rectal examination negative. Stool examination at no time revealed a diagnostic factor. Gastric analysis showed increased acidities. Free HCl, 64, total acidity 78.

Later the patient improved and gained weight. After two months of symptomatic treatment the patient supplied a stool specimen, which contained the

'inflammation' as she described it. In this stool the endameba histolytica were easily demonstrated.

*Geographical.*—The patient was born in Creal Springs, Ill. She moved with her family when four years old to Southern Missouri. Later she returned to Illinois; lived in Arkansas for one period of eight months, and again returned to Illinois. She came to St. Louis thirteen years ago, making frequent trips to Marion, Ill. From 1909 to 1912 she lived in Chicago, and was not outside of the city. For five months in 1913, she was in Marion, Ill. Since that time, or for two years, she has been uninterruptedly in St. Louis. She knew of no one afflicted with a similar trouble.

*Treatment.*—Intramuscular injections of  $\frac{1}{3}$  gr. emetine were used daily. The stools decreased in number in four days from six to two, and became normal in character. The general condition of the patient improved, and there was a gain of ten pounds in weight in the following three weeks. Only six injections were used.

One month after this course of treatment the patient returned and stated that for three days she had from three to six stools each day containing again the 'inflammation.' She was told that the former injections were not sufficient, and that she would have to have a longer course of the same treatment before she could expect to be permanently well. The patient did not return, and later could not be located, having removed from the city.

CASE II.—J. L., *æt.* thirty-eight, white, male, single, car builder. He complained of diarrheal attacks, at that time severe. These attacks had recurred for one and one-half years. He had frequent cramps in the epigastrium, unassociated with gastro-intestinal function, and was having stools about every fifteen minutes in the day, and very frequently during the night. The stools were fluid and at times contained blood. He denied venereal infections. His weight was stationary at 112 lb. His previous health was very good.

Physical examination was negative except for a moderate bradycardia, and slight tenderness to pressure in the left abdomen.

*Stool Examination.*—Small, watery, yellowish stool, which contained much mucus; no macroscopical blood; the guaiac test was positive. Endamebas were demonstrated in the mucus.

Sigmoidoscopic examination revealed many small, apparently shallow ulcers approximately  $\frac{1}{2}$  cm. in diameter and apparently localized to the rectum. The mucous membrane of the sigmoid was normal.

*Geographical.*—The patient had been a resident of Tennessee for several years at the time the infection developed.

*Treatment.*—An anti-diarrhea diet and the aluminum silicate ipecac tablets, one four times each day, were given. After three weeks the patient reported that he was 'one thousand' times better, and had no bowel action at night.

Sigmoidoscopic examination showed only a granular proctitis and a moderate amount of mucus in which endameba could be demonstrated. The patient was told that injections of emetine would be necessary.

The patient was then lost for seven months, when he returned with the same condition. Emetine injections were then used, one grain intravenously each day. After the third injection the stools became less in frequency; there was no urgency, and the character of the stools became more nearly normal. There was no effect from the injections such as nausea or dizziness. Sigmoidoscopic examination soon after the injections were begun, showed many ulcers in the sigmoid and an "eaten" condition of the rectum. Microscopical examination revealed no endameba. The intravenous emetine injections were continued, with several intermissions of a few days each, for fourteen injections. There was continued improvement. Not until after the eighth injection



were there any subjective symptoms, these being a slight, immediate dizziness, and nausea throughout the following afternoon.

Urine examination showed only a marked increase of urobilinogen by the Erlich aldehyde reaction.

The patient was free from symptoms for eleven weeks. Sigmoidoscopic examination then showed a mild ulcerative proctitis localized to the lower rectal ampulla. The endamebas were demonstrated in great numbers.

Treatment was again instituted with daily intravenous emetine as before. Response was very prompt. After the diarrhea had ceased, fractional doses of calomel, grain one-third, three times daily were given, also, irregularly, insufflations of calomel powder into the rectum.

CASE III.—F. S. B., *æt.* twenty-four, white, male. He complained of diarrhea for two days. Previously the bowels were normal. The stool was usually semisolid and without blood and mucus. He never before had dysentery. Two days previous he began to have from ten to twenty small stools daily, which consisted of blood and slime. He had cramps across the lower abdomen and severe rectal tenesmus. He thought he had had fever. He had terrific headaches. There had been no dietary indiscretions. His temperature was 100.6° F.

*Stool Examination.*—Very small quantity of muco-purulent, viscid material, resembling purulent nasal discharge, slightly blood-streaked and having a very foul and pungent odor. Microscopical examination showed endameba histolytica,—large, motile endameba with red cell inclusions and also many pus and blood cells.

Physical examination showed only an obesity, with indefinite suggestions of a ductless gland origin. His weight had increased from 180 to 228 lb. in the past year, and in the past week he had lost 5 lb.

*Geographical.*—He was born and raised at Renalt, Ill. He lived in Chester, Ill., for five years, and then came to St. Louis, two years ago. He had never been elsewhere and never knew others having a similar dysentery.

*Treatment.*—Intramuscular emetine injections were given, one grain each day for six days. Then one aluminum silicate ipecac tablet was given five times daily. These caused slight cramps. Improvement from the injections was prompt. On the fourth day the stools became much less frequent, contained no blood and very little mucus. There was no more tenesmus; the temperature was 98.6° F., and the patient's general condition continued good. Large amounts of mucus, viscid and transparent in character, continued in the stools for four months. The endamebas were never demonstrated in this.

Sigmoidoscopic examination made three months after treatment with emetine showed a granular edematous condition of the mucous membrane, with a small amount of mucus. No endamebas could be demonstrated.

The patient was then treated for mucous colitis with gradual improvement. On the antidiarrheal diet the patient lost, during six months, from 228 to 203 lb.

CASE IV.—G. E., *æt.* thirty-three, white, male, married, shoe factory worker. He complained of diarrhea and piles, and had had the diarrhea for fifteen years, in intermittent attacks, lasting usually about three weeks, and with intervals of one month. It had been continuous for the past three years. He had acute griping in the lower abdomen. He had daily from six to fifteen stools, which he described as fluid, foamy and yellow, at times black, and contained some mucus and no blood. He claimed that he had recently been cured of the morphine habit, acquired by taking for relief of the diarrhea, a mixture containing one-third of laudanum. He increased this until he was using in each twenty-four hours four ounces of a mixture, one-half of laudanum. He was very nervous. He had lost weight from 130 to 121 lb. in

the previous month. He had typhoid in youth. Fourteen years ago he was operated twice for ulcers of the bowel for relief of his diarrhea, but without result.

*Physical Examination.*—Slender, white male of asthenic habitus. The skin was very dry and scaly over the arms, legs and abdomen, however not of the hands and face. The hands were apparently cyanosed, and the face also, but in a lesser degree. There was a general indurative adenopathy. The thyroid was symmetrical and moderately enlarged. *Abdomen.*—The walls were tonic, without rigidity; there was slight tenderness in the epigastrium; the liver extended from the fifth interspace to the rib margin; the sigmoid was palpable and tender. The reflexes were present and normal.

The diagnoses of endamebic dysentery and of pellagra were considered. Dermatological consultation was arranged, but before this was secured endameba histolytica were demonstrated in the stool specimen.

*Geographical.*—The patient was born in Paducah, Ky., and lived there thirty years. In the past three years he had traveled over the southwestern states. He lived in Dallas, Texas, one year. He then returned to Paducah for four months. He has been in St. Louis since November, 1914.

*Treatment.*—The patient was advised that emetine injections would be necessary. However, because of work he was unable to come for these injections and the aluminum silicate ipecac tablets were prescribed. Four days after beginning the ipecac treatment, he was better than he had been for months. The stools were much less frequent and more nearly normal. The patient was taking nine tablets daily, which is equivalent to 90 gr. of the extract of ipecac.

The patient next appeared after eleven weeks. There was marked improvement. However, he was still having six to seven stools daily. He had gained five pounds in weight. He was still using the tablets and altogether had taken one hundred and fifty. He could not then use them so freely because they gave abdominal griping, and produced increase of diarrhea. *Sigmoidoscopic Examination.*—The mucous membrane was granular. There were no ulcers and no bleeding. There was a small amount of white mucus, in which no endameba could be demonstrated.

One month later the patient reported, after having been worse for one week. He was having a stool about each half hour; a small amount of bloody mucus. *Sigmoidoscopic Examination.*—The mucous membrane was covered with many small, characteristic punctate ulcers, and with much glairy mucus, in which the endamebas were demonstrated. Five intravenous injections of emetine were given, one grain daily. After the last injection the patient disappeared for one month, and, when he did return, stated that there was no improvement from the injections. The trouble had increased, and he was having from ten to twelve small slimy stools daily, and much rectal tenesmus. He could eat only soft foods. He was told that he should have more injections, but he did not return until after two months. He then had external hemorrhoids with much bleeding and tenesmus, and had lost five pounds in weight. On sigmoidoscopic examination, the mucous membrane showed characteristic endamebic ulcerations, small shallow ulcers 5 mm. in diameter; coated by a gray mucus and bleeding when this was removed. Endameba histolytica were demonstrated in large numbers in the mucus. Emetine was again used in daily intravenous doses of one grain. The stools rapidly decreased from twelve to one or two normal actions daily. He gained 6 lb. in weight the first week. The rectal mucous membrane rapidly changed into a granular healing condition.

The patient next reported after six weeks with all his symptoms worse than before, and was discouraged, and opposed to the emetine treatment. The physical examination showed great tenderness over liver, with fine crepitation with its respiratory excursion. This was interpreted as a peritoneal rub, and the presence of an hepatic abscess considered probable. His temperature was

100° F. Sigmoidoscopic examination showed many characteristic endamebic ulcers. Endamebas were demonstrated in great numbers in mucus from these. Patient was sent into the hospital, but would not remain, and has not since been seen.

CASE V.—A. P., *æt.* twenty-eight, colored, female, married, laundress. She complained of cramps in the stomach, of diarrhea with blood in the stools, and of loss of weight. She had had the diarrhea for eighteen months, in two attacks, the second continuing for the past three months. She had cramps in the abdomen, which were transabdominal and greatest in the left lower quadrant. The patient had had daily from four to seven stools, small, loose, yellow, and with considerable blood, but no 'slime' or mucus. Defecation was painful. Venereal infection was denied. She had lost weight.

Physical examination showed a frail, colored woman of slender asthenic habitus. The sigmoid was palpable, spastic, and slightly tender. Otherwise the examination was unimportant. Sigmoidoscopic examination revealed the characteristic ulcerations of endamebic infection. In the mucus obtained directly from the ulcers, endamebas were found in great numbers.

*Geographical.*—The patient has spent all of her life in St. Louis except for infrequent, one-day excursions to Jefferson City, Mo. She knew no one afflicted with a similar trouble.

*Treatment.*—The patient was immediately started on subcutaneous emetine injections, receiving one grain each day for six days. Afterwards the emetine was given intravenously and continued until the patient had had fourteen doses, distributed over four weeks. The stools very promptly changed in number and character to a normal condition, and the patient gained in weight from 99 to 105 lb. Endameba could not be demonstrated after the fourth day. The condition of the bowel rapidly changed to a granular proctitis and sigmoiditis, and at the end of three weeks was normal. There was a tendency to constipation.

The intravenous administration caused immediate dizziness, some slight strengthening of the pulse, but no change in rate, and the patient stated that for from one to three hours afterwards there was a moderate nausea, at no time producing vomiting. The patient, however, insisted that the subcutaneous administration affected her in the same way.

CASE VI.—W. F. M., *æt.* fifty-one, white, male. He complained of stomach trouble and diarrhea. The diarrhea had continued almost constantly for three years, with the exception of four months following previous treatment. The diarrhea was characterized by several watery stools daily, with some mucus, but no blood. He had lost 15 lb. in weight during the three years.

Physical examination was unimportant except for pyorrhea alveolaris, and a general abdominal tenderness. The urine had a very faint trace of albumin, a large increase in urobilinogen by the aldehyde reagent. The feces showed much mucus, endameba histolytica, and many trichomonas intestinalis. Sigmoidoscopic examination showed a granular edematous mucous membrane covered by a moderate amount of mucus in which were demonstrated non-motile endameba.

*Geographical.*—The patient was born in Minnesota. He spent a winter in Arkansas twenty years ago, and was treated there for rheumatism. He was then in Arizona for eight years. He had been in Minnesota for the previous two years, excepting for several months in the winter of 1914-15, which were spent in Florida, Alabama, and Mississippi. He had just previously come to St. Louis from Minnesota. The patient said that the onset of the diarrhea was during his residence in Minnesota, prior to his visit to southeastern states.

*Previous Treatment.*—The patient was treated at the Mayo Clinic in the fall of 1914, and again in March, 1915, by injections, presumably of emetine,



twice daily for eight days, and also with some oral medication. Improvement followed, but only for two weeks. In May, 1915, he was treated a third time during thirteen days, receiving similar injections, and also with petroleum enemata every other day. He improved after this until the following November.

*Treatment.*—The patient was given daily intravenous injections of emetine, each one grain. Improvement was very prompt. Fourteen injections were given. Each gave immediate, temporary dizziness, and a slight nausea for several hours afterwards. The endameba were never found in the stools after the first examination. No endameba could be demonstrated from the pyorrhea pockets on the seventh day after the commencement of treatment. The patient's weight increased from 144 to 150 lb., and he improved, but complained of stomach symptoms of a simple nervous dyspeptic character. He was last seen three months after beginning of treatment and showed continued improvement.

CASE VII.—C. N., *æt.* twenty-five, white, male, single, teamster. He complained of pain in the abdomen which he had had for eight months, in two attacks. The first attack of two months was relieved by treatment for endamebic dysentery in the St. Louis City Hospital. He had had this attack for three weeks. He had pain in the central epigastrium, extending to the right side and back, and it was continuous. The pain formerly was noticed only with the jar of his wagon. He then could not lie on the left side. Diarrhea first appeared in July, 1915, with daily four to nine stools, small, foul-smelling, and containing "bloody slime and corruption." He entered the City Hospital and was treated for endamebic dysentery during three months. The diarrhea ceased immediately after injections of emetine. After he left the hospital, the stools had occurred once each day, and were soft, brown, and without blood or mucus. He was unable to work because of pain. In the first attack he lost from 180 to 150 lb.; regained to 160 lb., and had lost in the previous two weeks to 152 lb.

*Physical Examination.*—He was anemic, but with otherwise fair nutrition. The abdomen showed moderate spasm in the right upper rectus. There was tenderness in the same region without corresponding respiratory inhibition. The liver extended from the fourth intercostal space to the costal margin. The temperature was 100° F. The blood-pressure was 104-72. The diagnosis of endamebic infection with the possibility of hepatic abscess with perihepatitis was made. Sigmoidoscopic examination showed a mild granular sigmoiditis and proctitis. Microscopical examination of feces showed three endameba histolytica, without red cell inclusion. The urine showed a trace of albumin and a marked increase of urobilinogen by the aldehyde test. A blood smear showed slight anemia and a normal differential count.

*Geographical.*—The patient was born in St. Louis, and had made frequent visits to relatives at Sulphur Springs, Mo. He had never traveled elsewhere. He knew of no person who had a similar condition.

*Treatment.*—Eleven intravenous injections of emetine, each one grain, were given during three weeks, starting with five consecutive, daily administrations. The patient was free of pain and began work on the fifth day. His temperature was normal and his weight increasing. At the end of two weeks he had gained 10 lb.

The aldehyde reaction for increased urobilinogen became negative.

There was at no time any unpleasant reaction to the injections.

Relapse with diarrhea, and marked ulcerations limited to the rectum, occurred after four months.

He again promptly improved with intravenous emetine. The aluminum silicate ipecac tablets were also given.

CASE VIII.—W. A., *æt.* seventeen, black, male. Complained of bloody stools and indigestion for six years. He had griping pains, diffuse in the central abdomen, and not severe. He had daily from two to four soft stools, often streaked with blood. He was gaining weight.

Physical examination was unimportant, except for moderate pyorrhea and slight general abdominal tenderness. The feces showed endameba histolytica. Sigmoidoscopic examination showed marked congestion and edema of the mucous membrane, with many small, shallow and bleeding ulcers in the lower rectum. Microscopical examination of mucus from this region showed frequent endameba histolytica. The Wassermann reaction was negative.

*Geographical.*—He was born in Nashville, Tenn. He moved to St. Louis when twelve years old, and has been in St. Louis since, except for occasional one-day trips into the surrounding country.

*Treatment.*—Emetine hydrochloride intravenously gave prompt and complete relief.

#### DISCUSSION.

The place of origin of these cases is of primary interest. One case was never outside of St. Louis, and I have observed one other case not recorded in this series, a boy of fourteen years, who had never been outside of St. Louis. Two cases have lived in St. Louis and have never been outside except for visits within the State of Missouri. One other case was probably a resident of St. Louis when the infection developed, or his infection must have developed while in the adjacent Illinois territory or during a short residence in Chicago. Two cases obviously developed during residence in southern states. Two cases were wanderers and no conclusion can be drawn as to where their infection may have been acquired.

The history in 4 of these cases was so characteristic as to warrant, in the absence of any other findings, the trial of the emetine treatment. In 2 cases the diagnosis was made on the history of previous treatment and laboratory findings. One case was diagnosed merely by the laboratory examination. The discovery of endameba in the stools is not pathognomonic, as illustrated by a case not included in this report, which was referred to me with the diagnosis based upon the laboratory findings. After therapeutic failure of emetine, a sigmoidoscopic examination revealed a polypoid growth in the sigmoid. This was removed, and the patient is well.

In 3 of these cases there were ulcerations throughout the rectum and sigmoid. In 3 cases the ulcers were localized to the lower rectum. Two cases gave negative sigmoidoscopic findings, with endamebas free in the feces, presumably originating higher in the proximal colon.

The cases treated with aluminum silicate ipecac tablets improved promptly, but did not show complete symptomatic adjustment, and relapsed after one month, even when a total of fifteen hundred grains of ipecac had been taken. One case treated with six daily subcutaneous injections of emetine,  $\frac{1}{3}$  gr. each, relapsed after one

month. All cases treated by daily intravenous injections of emetine, one grain each, showed immediate and complete symptomatic improvement. Early recurrence in most of these cases makes a cure in any of the others very doubtful.

One case which relapsed promptly, at no time afterwards gave full symptomatic response to intravenous emetine. The suggestion is obvious that the endamebas may have become emetine fast. One case giving definite symptoms of hepatic abscess improved promptly with intravenous treatment of fourteen 1 gr. doses, and relapsed with ulcerative proctitis after four months.

The value of emetine therapy by oral or by parenteral administration was demonstrated by the prompt relief of all symptoms and by the rapid and complete healing of the visible intestinal lesions. The tendency to relapse may be explained by a residuum of infection, which is allowed when either method of administration is used alone.

It was not found necessary to use morphine or opium in any but one case, and this was as opium suppositories, because of rectal tenesmus. One case which had acquired severe morphinism because of his use of opium preparations in controlling the diarrhea illustrates a great danger in using the drug in this disease.

No serious toxic symptoms of emetine have occurred in my experience. The intravenous injections of one grain each were taken in several cases without the least immediate or remote subjective disturbances. In other cases there was an immediate effect described as a dizziness, weakness, and sleepiness. The morphine habitué experienced a stimulation, which he described as a "drunk feeling," and it made him suspect that morphine had been used. The remote effect occurred usually within one hour, and was a nausea, often producing retching, but in no case actual vomiting. Some of the patients complained of nausea during the four or five hours following the injection. One patient claimed that subcutaneous administration gave the same effect. In one non-endamebic case in whom the drug was used for a therapeutic test, there was after twenty-four hours a severe attack of vomiting and diarrhea, which could not necessarily be ascribed to the injection.

The aldehyde reaction for urobilinogen in the urine showed an increased amount before treatment in several cases and became normal after treatment. It may be considered as a very helpful guide in judging the improvement in the intestinal conditions. The test is considered only as indicating the toxic effect upon the liver of absorbed substances from the abscesses in the bowel, and not as being in any way directly diagnostic of hepatic abscess, although in one case a diagnosis of hepatic abscess was fairly certain and the urobilinogen reaction returned to normal after treatment.



## CONCLUSIONS.

1. The presence of these cases of endamebiasis among approximately one thousand unselected gastro-intestinal patients suggests its greater frequency in St. Louis and vicinity than is generally considered.

2. Emetine has a direct and curative action upon the lesions of endamebiasis, but when used by either oral or parenteral administration alone, it fails to eradicate the infection.

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## CHRONIC HEADACHE.

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Headache is probably the most common of all presenting symptoms, and yet our knowledge of its causes and prevention or treatment is extremely meagre. All authorities seem to agree that headache is merely symptomatic, but agreement ends at this point, for there is the widest divergence of opinion as to what disease or condition this symptom is secondary. For instance, we have recently seen reported from one part of the country<sup>1</sup> some cases of gastric headache, which an observer<sup>2</sup> at a distance, after going over the histories, concludes were all due to eye-strain.

The easily available literature on headache is unsatisfactory for several reasons. In the first place, the bulk of it has been produced by German neurologists who naturally describe headache as seen in the clinic or consulting room where the more severe forms predominate. In the second place, the clear-cut descriptions of the different varieties of headache are not accompanied by any clinical data on which to base these distinctions. In the third place, the ordinary 'sick headache,' as we see it daily in family practice, does not seem to us to coincide with any clinical description, or to fit into any classification with which we are familiar, with possibly one exception.

Few subjects are as confused as the attempted classification of headaches on the basis of etiology. Randleman<sup>3</sup> classifies headache as persistent or organic, recurring or functional (including migraine and neuralgia), and occasional or toxic. Edinger<sup>4</sup> divides the subject into functional and organic; in the first class he places the headaches of children, of adolescents, of the anemic, and vasoparalytic headaches; in the second class he places migraine, indurative, and syphilitic headaches. Butler<sup>5</sup> gives eight varieties of headache exclusive of migraine, while Peck and Hecht<sup>6</sup> mention fifteen kinds of headache. Struempell<sup>7</sup> classifies headache (exclusive of migraine) as anemic, hyperemic, neurasthenic, and rheumatic. Auerbach<sup>8</sup> divides the subject into migraine, neurasthenic or exhaustion headache, nodular or rheumatic headache, and the symptomatic headaches of the infectious diseases, brain tumor, etc. Shields<sup>9</sup> classifies headaches as functional, organic, and circulatory, with fifty-one subdivisions, placing syphilis, malaria, and cirrhosis in the functional class. Behan<sup>10</sup> divides the causes of headache into intracranial and extracranial with fourteen subdivisions, placing

general diseases in both classes. Cabot<sup>11</sup> discusses fourteen causes for headache, tabulating about 3,000 cases under ten heads, 20 per cent. of these cases being due to unknown causes. He gives the details of 22 cases, 20 of which were due to definite organic disease, one to psychic causes, and one to unknown causes. He has done medicine a great service by abolishing lithemia, rheumatism, and the female generative organs as explanations for headache, and by emphasizing the fact that severe anemia is not usually accompanied by headache. He also shows that the location of the pain, its severity, character, chronicity, and time of onset are ordinarily worth very little from the standpoint of differential diagnosis. So far, a fairly uniform description has been given by the various authors of migraine, indurative, and neurasthenic headaches only.

There seems to be no closer agreement concerning the incidence of the various types of headache than there is concerning the cause. Edinger in Frankfurt, Germany, finds indurative headache the most common form, while Auerbach in the same place says migraine is the most common type, and Flatau<sup>12</sup> maintains that indurative headache is rare in Germany. In his analysis of 2,946 hospital cases, Cabot attributes 35 per cent. of them to psychoneuroses, while migraine and indurative headache are each credited with only 3 per cent. At the same time he says he has no cases of indurative headache in his own experience to report.

The views expressed in the literature on the pathology of headache vary as much as those on etiology and incidence, but it seems to be agreed by all that headaches "are perceived in the innervation areas of the trigeminus and of the sensory branches of the upper cervical nerves" (Auerbach). Edinger states that "somewhere in the cutaneous or dural branches which supply the attacked area lies the pathologic cause"; both Auerbach and Campbell<sup>17</sup> think that irritation of the sensory endings of the sympathetic running in the vessel walls of the dura may produce headache, Campbell including the vessels of the brain itself, and Auerbach including the intracerebral portion of the root of the fifth nerve.

Concerning the character of the nerve irritation producing headache, Auerbach includes both chemical and physical agencies, injury, pressure, vasomotor anemia and hyperemia acting through the vasa nervorum and toxins. Edinger considers that toxic injury to the dural nerves remains to be proved, and that in the last analysis pain is produced by vasomotor anemia or hyperemia of these nerves.

We have no new hypothesis to offer as to the cause or the mechanism of headache, and any further classification of the subject would be superfluous. We can offer only a few clinical obser-



vations on headache, with the data from 50 consecutive cases in which no organic lesion was found to account for the symptoms.

The most common type of chronic or recurring functional headache, that associated with constipation, rarely comes even to the family physician—the druggist usually takes care of these cases with purgatives and patent headache remedies. In the same way people with eye-strain headaches seem to connect cause and effect, and go direct to the oculist. At least there is a general impression here as elsewhere that eye-strain is a large factor in chronic headache, but so far we have not been able to unload any appreciable number of these headache sufferers on the oculist. All the cases here reported had at one time or another their eyes examined, and a fourth of them were sent to the oculist again when first seen, but without relieving their pain. Cabot's psychoneurotic headaches will not constitute more than 3 per cent. of the headaches met with in general practice here.

Up to the present time we have not been able to find indurations or nodules in the muscles of the neck or scalp in any of our cases, probably because of lack of experience; but on the other hand very few have had daily discomfort, thermic influences have been unimportant, and massage has rarely proved beneficial. In the same way migraine seems out of the question. Our patients have not had the neuropathic family history, the aura, the eye symptoms, the sudden cessation of pain, etc., encountered in this type. (About 5 per cent. of our headache patients have had typical attacks of migraine, which were not included in this series.) Auerbach's neurasthenic or exhaustion type attracted our attention, because our patients can generally produce an attack of headache experimentally by fatigue, but when he states that usually there is no actual pain but a feeling of oppression, that there is no tendency to periodicity, and that even the most severe forms are not associated with nausea or vomiting, he rules our cases out. Campbell in his delightful common-sense paper on headache describes, among other varieties, functional headaches due to circulatory disturbances and to morbid blood states, but his clinical picture does not tally with ours.

Edinger's clinical description of his 'headache of the anemic' very nearly fits our cases, except that our patients were not anemic, as will be shown by the blood records. However, he himself adds that "another factor must be added, since, in the majority of anemics, the headaches are not persistent." We also disagree flatly with Edinger in his statement that "the intensity of the pain corresponds with the debility of the patient," and think his statement that "the intervals between the attacks of pain are very brief" is much too sweeping. His clinical description of this type of headache is given in its entirety in the following very suggestive sentences: "The most serious forms I have seen were in girls who had made great

efforts to pass a teacher's examination, and soon afterwards began their arduous work, which, if conscientiously performed, gives them little time for recreation. This severe form also occurs in poor, undernourished women who by anxiety and frequent pregnancies, by overworking for their children, by insufficient food and unhygienic mode of life, have reached an unfortunate state of general debility." As Edinger offers no evidence of anemia in this description, we think that the 'headache of general debility,' or of 'overstrain,' or of 'chronic fatigue' would fit his description much better than the present title. As a matter of fact, headache is not a prominent symptom either in our anemic hook-worm sufferers or in pernicious anemia cases, so that we place very little emphasis on anemia. But aside from the title, that two-sentence description certainly suggests the entire clinical picture.

These headaches occur mostly in women between the ages of twenty and forty who are living under strain of some sort. Frequently the headaches started during the school life of the girl, at first coming on infrequently and almost always at the menstrual period. Ordinarily no complaint is made at this time unless the headaches are very severe or become very frequent. Later, after some years' work as teachers or stenographers, or when these young women become engaged to be married, the strain under which they live brings into evidence many functional symptoms, headache among them. Still later in life, after bearing children in rapid succession, or with a house full of small children to look after, and with the cooking, cleaning, sewing, shopping, and often the washing to do, the deadly routine of this sort of thing, year in and year out, with no holidays, finally wears them down, and the headaches, which they have had occasionally at the menstrual period for years, become a regular occurrence. Then these headaches begin to appear at any time between the periods after a little extra exertion until they finally lose all connection with the menses. The headache becomes more severe, lasts longer, and comes on after less provocation, until in some cases it is almost continuous and the fatigue incident to doing the simplest necessary things seems to cause it.

During the time these headaches are increasing in frequency, in duration and in severity, other functional symptoms always make their appearance. The menses may recur every three weeks or even every two weeks, and the duration and amount of flow may increase until these patients are menstruating a third or half their time. Dysmenorrhea may be added to the picture and leucorrhea is a very constant and very troublesome symptom.<sup>13</sup> As the headaches increase the appetite fails and the majority of these patients are considerably undernourished; the tongue may be coated with diminished gastric acidity; but particularly in cases of mental over-

strain there may be pylorospasm with pyrosis. A good many develop constipation, while in a few, early morning diarrhea makes its appearance, especially during hot weather; this diarrhea may alternate with constipation, according to the condition of the weather (probably due to fluctuations in vasomotor tone). At the same time instability of the heat-regulating mechanism may appear, permitting unusual diurnal variation of the body temperature.<sup>14</sup> The secondary anemia is very mild. One of the most trying of the accompanying symptoms is insomnia. General muscular tone is poor, and backache is frequent. As in any state of general debility, the function of the circulation is depressed with a tendency to vasodilatation and low systolic blood-pressure. The relative importance of these various symptoms may vary considerably during a year's observation, the headache at times subsiding entirely, while insomnia, constipation, or gastric symptoms constitute the clinical picture.

The headache itself is generally frontal, that is through the temples just behind and over the eyes. It is frequently unilateral. The eyeballs are frequently sore when moved and occasionally the scalp is sensitive. The character of the pain in the majority of cases is described as dull and steady. Only occasionally is it said to be sharp or cutting or boring, and never shooting. At times it is throbbing and in about half the cases is made worse by bending forward or by exertion.

Many of these patients will wake up in the morning with a dull or full feeling in the head, knowing well that by midday the headache will be fully developed. Sometimes the patient knows that entertaining company or house cleaning will mean a headache when she wakes up the next morning. In other instances, the headache will appear about an hour after returning from church, or from a shopping trip uptown, or after a party. With a smaller number, a slight feeling of discomfort during the morning will become well pronounced headache by suppertime. Onset after supper is rare, and even the severe forms do not seem to prevent sleep.

In early or moderate cases the headache will disappear with the first night's sleep. On the other hand, we have known severe cases to last five days and recur after two to four days' free interval. The termination of an attack is always during sleep at night.

In all cases the appetite fails almost completely during the attack; some have nausea, and some have prolonged vomiting with every attack. In many patients there is nausea and vomiting only when the headache is severe, and these symptoms seem to vary directly with the severity of the pain.

Happily not all cases are progressive; an increase in suffering will frequently automatically cause less work and more rest, thus postponing a complete breakdown. As the children grow up, becoming



less of a burden and more helpful, the mother's headaches improve, and the menopause, by abolishing the monthly strain on the system, always brings marked improvement; in fact these headaches are rarely seen after the menopause.

We have been struck with the fact that this type of headache in women so frequently starts shortly after the girl has fettered her physical activities with corset and long skirts, and has adopted the indoor life. This complete change in the mode of living after puberty means a sad deterioration in physical strength from childhood, when girls live an active outdoor life and are no more subject to headaches than boys. Women in towns live almost entirely within doors and almost never take any real exercise; they protest, of course, that they get plenty of exercise in their daily occupations, but their muscular tone and development rarely bears out this contention. In striking contrast to these headache sufferers among white women, are the negro women as a class: the latter almost universally show excellent muscular tone and development and chronic sick headache among them is rare.

The men we have seen with this type of chronic headache were all leading the modern city life, working indoors for long hours, without exercise, and carrying the responsibility of a business or the strain incident to studying, teaching, or preaching.

This so-called anemic headache of Edinger constitutes from 80 to 90 per cent. of the chronic or recurring non-organic headaches met with in general practice in this locality. We have placed in tabulated form the clinical data from 50 consecutive cases, as follows:—

1. Sex: Males 12, females 38.
2. Age: Males when first seen from twenty-one to forty-nine years. Ages at onset were, second decade 2 cases, third decade 4 cases, fourth decade 1 case, fifth decade 3 cases, no data 2 cases. Duration of complaint one year or less 3 cases, one to five years 5 cases, six years 1 case, thirteen years 1 case, no data 2 cases. Average duration in males 3.7 years. Females when first seen eighteen to forty-four years. Ages at onset were, first decade 1 case, second decade 15 cases, third decade 12 cases, fourth decade 6 cases, no data 4 cases. Duration of headache one year or less 9 cases, one to five years 9 cases, five to ten years 11 cases, ten to sixteen years 4 cases, thirty years 1 case; no data 4 cases. Average duration in females 5.8 years.
3. Color: All white. In our negro dispensary work this type of chronic headache is rare.
4. Social status: Males: married 7, single 5; females: married 22, single 14; widows 2.
5. Occupation: Housewives 23, school girls 2, house-keepers 2, stenographers 6, school-teachers 2, house maids 1, society girls 2; business men 6, students 2, clerk 1, butcher 1, preacher 1, druggist 1.
6. Physical examination: Negative in 44 cases, visceroptosis in 3 cases. Pregnancy, portal cirrhosis, and gonorrheal endometritis had supervened in 1 case each.
7. Presenting symptoms: Headache 16 cases, headache and vomiting 2 cases, headache and nervousness 2 cases, headache and malaise 2 cases, head-

ache and backache 2 cases, headache and hunger-pain 1 case, nervousness 3 cases, indigestion 7 cases, edema of the ankles 1 case, general weakness 6 cases, diarrhea and backache 1 case, backache 3 cases, insomnia 3 cases, sore mouth and pellagra-phobia 1 case. It will be seen that in 25 or 50 per cent. of these cases headache was one of the presenting symptoms.

8. Frequency of headaches when first seen: Every day 4 cases, two to three times a week 7 cases, once a week 9 cases, every ten days 6 cases, every two weeks 5 cases, every three weeks 4 cases, every month 7 cases, every five weeks 1 case, every two months 1 case, every three months 1 case, every six months 1 case, often 3 cases, occasionally 1 case. In 35 or 70 per cent. of the cases the headache occurred oftener than the normal menstrual cycle.

9. Relation of headache to menses: Five patients gave a history of having headaches at the menses. Eight gave a history of headaches most often at menses. Four gave a history of headaches coming at menses formerly, but no longer confined to this period. Eighteen patients stated that their headaches had no relation in time to their menstrual periods. No data in 3 cases.

10. Time of onset: Wake up with headache 10 cases; onset in the morning, 8 cases, about midday 3 cases, in the afternoon 7 cases, at night 1 case, any time of day 11 cases; no data in 10 cases.

11. Duration of attack: One day, disappearing the first night, 15 cases; one to two days, disappearing the second night, 8 cases; two days, disappearing the second night, 7 cases; three days, disappearing the third night, 7 cases; four days 3 cases; five days 2 cases; one week 1 case; two weeks 1 case; continuous or daily 4 cases. No data 2 cases.

12. Location of the pain: Frontal, that is through the temples, behind and above the eyes, 36 cases; occipital 2 cases; both frontal and occipital 8 cases; frontal, occipital, and vertical 1 case; vertical 1 case; in the center of the head 1 case; no data 1 case.

13. Character of the pain: Described as severe in 2 cases, fairly sharp in 1 case, boring in 2 cases, dull in 44 cases; no data in 1 case. Throbbing in 9 cases, steady in 41 cases.

14. Soreness of eyeballs and scalp: Eyeballs sore in 23 cases, not sore in 9 cases; no data in 18 cases. Scalp sore in 7 cases, not sore in 1 case, no data in 42 cases.

15. Eyes: Thirteen cases sent to oculists for refraction with some improvement in 1 case. No record of the number wearing glasses.

16. Nose: One case complained of chronic nasal catarrh; 3 cases were sent to rhinologists for removal of septum or turbinates, but without relieving their headaches. In 46 cases the nose and accessory sinuses were normal.

17. Appetite: Anorexia given as a symptom in 27 cases; appetite normal in 23 cases.

18. Caloric intake: Ten calories or less per pound per day in 17 cases; from ten to thirteen calories per pound per day in 9 cases; above thirteen calories per pound per day in 3 cases; average in 29 cases was 10.3 calories per pound per day. No data in 21 cases.

19. Weight: Eight cases were either normal or fat. Anything less than 5 lb. was considered a normal variation. From 6 to 10 lb. below normal weight, 13 cases; off 11 to 15 lb., 10 cases; off 16 to 20 lb., 12 cases; off 21 to 25 lb., 3 cases; off 26 to 30 lb., 1 case; 3 cases were off 35, 40, and 45 lb. respectively. Average loss of weight in 42 cases was 14.24 lb.

20. Gastric symptoms: (a) During the headache: Nausea in 10 cases; vomiting in 12 cases; normal in 27 cases; no data in 1 case. (b) Between headaches: Normal in 28 cases; eructations in 2 cases; sour, acid, or burning stomach in 6 cases; pain after meals in 3 cases; morning nausea in 2

cases; nausea and fulness in 1 case; fulness in 2 cases; indigestion in 3 cases; hunger-pain in 2 cases; free HCl absent in 1 case.

21. Bowels: Normal in 25 cases; constipated in 21 cases; early morning diarrhea in 2 cases; alternating constipation and early morning diarrhea in 2 cases.

22. Nervous symptoms: Twelve cases complained of nervousness, 4 of palpitation of the heart, 3 of frequent urination, 2 of numbness, 1 of tingling, 3 of restlessness, 1 of vertigo, 1 of depression; 1 had occasional attacks of angioneurotic edema, and 1 was hysterical. In 21 cases none of these symptoms were complained of.

23. Of the 38 women, 22 complained of leucorrhea, 15 were free from this complaint, and one had a gonorrheal leucorrhea.

24. Backache: Present as an intermittent chronic symptom in 30 cases, absent in 20 cases.

25. Insomnia: Complained of in 33 cases, absent in 12 cases; no data in 5 cases.

26. Effect of pregnancy on the headaches: Disappeared entirely during pregnancy in 4 cases, became worse in 2 cases.

27. Urine uniformly negative for albumin, sugar, and casts; indican occasionally present.

28. Blood: (a) Hemaglobin (Tallqvist) from 70 to 79 per cent in 10 cases; from 80 to 89 per cent. in 28 cases; from 90 to 100 per cent. in 6 cases; no data in 6 cases. (b) In a differential blood count in 44 cases no abnormality was found except an eosinophilia of 10 per cent. in 1 case, for which no cause could be discovered.

29. Systolic blood pressure: From 95 to 100 mm. Hg. in 5 cases; 101 to 110 in 7 cases; 111 to 120 in 21 cases; 121 to 130 in 5 cases, 131 to 140 in 1 case; 145 mm. Hg. in one case. No data in 10 cases.

As pointed out above, we are largely dependent upon our neurologists for the literature on headache. Their descriptions of these chronic fatigue headaches are always found under the caption 'neurasthenia'; this term implies mental symptoms. Barker<sup>15</sup> states that "in the neurasthenic, and especially in the psychasthenic states, the symptomatology is predominantly mental." Dercum lists the secondary psychic symptoms of neurasthenia as lack of will-power, combined with hesitation, uncertainty, indecision, irritability, and fear.

We object to calling these headaches neurasthenic or psychoneurotic first, because these terms with their implication of a morbid mental or nervous state have come to excite a very unsavory taste in the mouth of the public; in the second place, in the majority of our cases we have not found mental symptoms present; in the third place, although Dercum says the symptoms and pathology of neurasthenia are those of chronic fatigue, we can see no more advantage in giving these headaches a neurological name, such as neurasthenic or psychoneurotic, than in labeling them gastric, menstrual, adolescent, anemic, etc., according to the period of life during which they occur, the prominence of associated symptoms, or the special field in which the observer labors. This method of classifying headaches has the disadvantage of causing constant



confusion, and often the disadvantage that the naming of such a period of life or organ implies an etiologic relationship to the pain.

While the morbid physiology of individual organs in chronic fatigue will vary widely in different cases, the qualitative effect on the organism as a whole is the same, so that whether the headache of this type be mild or severe, frequent or infrequent, a major or a minor symptom, the therapeutic indications will be the same, and if treatment be not directed to the body as a whole it will be futile.

The treatment of this type of headache is laid down by Edinger in one line, to the effect that only rest and forced feeding are of any avail. We think physical exercise is also necessary, and some form of amusement or relaxation often advisable. Frequently simply getting away from the drudgery of home-life for a time will bring about great improvement, but the attempt should be made to educate these patients to live above the level of headaches in the future. After some very trying experiences, we subscribe to the truth of Edinger's statement, "that the treatment of these cases cannot well be carried out at home, especially if there are small children in the household, but the patient should go to a hospital or some similar institution." However, many cannot afford to go away, and many refuse to leave home for such a minor thing as headache, so that home treatment is necessary.

During the attack itself, in well-established cases, we know of no remedy that will stop the pain; even morphia, while it may ease the head somewhat, simply prolongs the attack. In early cases the ordinary analgesics afford some relief. We generally tell these patients that we cannot help the individual headache, but that in a number of months we can largely prevent them if instructions are carried out. An attempt is then made to regulate the amount of activity and rest, and the amount of food and exercise taken during the twenty-four hours. A high caloric intake is prescribed with rest in the middle of the day. No exercise is given at first to badly run-down subjects; later short walks, or golf, tennis, or gymnasium are prescribed. The most serious difficulty is to eliminate the cause of the strain; a visit out of town is generally asked for first; church and social duties are then cut down; on one occasion we prescribed a cook for a housewife who was doing the work of three men. Some outside interest or recreation is generally suggested and a return to normal weight is always insisted on. Patients are asked to report and weigh at regular intervals. At times we ask for a diary of all the daily activities, and go over this once a week.

In spite of persistent effort our results at times have been rather discouraging. To tell a woman that she must live according to directions for a year or more is a large order. With the first signs of improvement she begins to break over the traces; she becomes lax about reporting and weighing; she begins to indulge in more

activity; the advent of a new baby may spoil a year's work; and serious family worries often cannot be removed at all. To make women take regular exercise is always a Herculean task, as their training, mode of life, and dress handicap them. A financial status that forces the wife to be a breadwinner as well as housekeeper and mother is an almost insurmountable obstacle. But in spite of all these various difficulties, those chronic headache sufferers, who are given the opportunity or who will take the trouble, can cure themselves absolutely in time.

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## OBESITY.

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Obesity has always been the subject for the humorist. It is no wonder then, that what we do know about the subject are the droll situations in which the over-stout finds himself. For the humorist in his flight of imagination sometimes divorces himself of the Goddesses of Truth and Fact, and espouses the Divinities of Fancy, Frolic and Nonsense. And what can be a more fitting subject for such fanciful flights than over-corpulency?

Whenever I think of the obese and of obesity I call up the picture of stout Sir John Falstaff, who has been described as a globe of flesh spotted over with continents of sin. The cause of Sir John's corpulency was his gluttonous appetite, his unquenchable thirst for small ale, his pursuit of the gay dames that lived in Mrs. Quickly's hostelry, and his incurable laziness. And in its wake, there followed great unpleasantness to honest Sir John. For he was short of breath, and he perspired profusely and he had severe pains in his big toe. And above all, if you remember the fate that befell him in his dealings with the merry wives of Windsor, he lost all the attractions that he once had for the fair sex. You remember how he was stoutly cudged as he made his escape in the disguise of an old woman, and you also recall how he was thrown with several pieces of ill-smelling clothes into the river.

Poor Sir John! We can parody the Windsor husbands and exclaim that we like not fat people, and especially those obese sirens that sing, with short breath, songs that fail to lure even the most unworldly.

Obesity is a metabolic disorder, commonly assuming the form of hypernutrition, and is characterized anatomically by an excessive amount of body fat. It assumes clinical importance when the fat deposits throughout the body become burdensome or produce impairment of function, as shown by disinclination to muscular exercises, palpitation of the heart, dyspnea and other features. The condition is associated with, and dependent on, a variety of underlying affections; so that it may be rightly considered as a symptom rather than a pathological entity.

In the latter part of the last century, with the advance in biological chemical knowledge, much work has been done to establish the metabolic cause of this disease. Scientists have experimentally established the origin of fat from carbohydrates, albumins and fats of the food, and, moreover, have elucidated the causes and path-



ological processes involved in nutrition, hypernutrition (fatness) and subnutrition (leanness). The recent literature of nutrition has attained to quite considerable proportions, and among the most valuable researches on the subject are those of Moleschatt, Ranke, Voit and Foster, whose combined studies have given us an accurate determination of the food requirements under normal conditions. Metabolic investigations have also proved that obesity may result from inordinate stimulations of the physiological functions due to over-alimentation as well as by all the processes which tend to show the organic oxidations.

What are the causes of obesity?

Before discussing the direct disturbances that go on in the body to produce obesity, we shall first consider the predisposing or remote causes of this disease.

Heredity plays a rôle. The acquiring of obesity cannot be said to depend upon the indolence of the ancestors so much as upon the peculiarities of the digestive and assimilative powers. Perhaps heredity is but an indirect factor. It is well known that gout is transmitted from father to son, and since gout is a predisposing factor to obesity, heredity thus plays a part in its causation.

The general tendency to an abnormal accumulation of fat is more pronounced at certain periods of life than others. In young infants a marked degree of obesity may occur, and in many cases it is principally ascribable to the milk and farinaceous articles of food consumed in the diet. In the majority of instances, corpulency develops later in life: in the male during the period between forty and fifty years, and in the female during the fourth and fifth decades.

Obesity, under normal conditions of life, is more common by far in the female than in the male. The theory has been advanced that this predisposition of the female to obesity was due to the fact that her blood had a lower percentage of hemoglobin, and that, therefore, the oxidizing processes in the body were slower. This, however, has been derided by other observers.

Childbirth plays an important part in inducing corpulency, the more children a woman bears the greater the tendency to fatness. Other factors expressly favorable to the development of an abnormal amount of fat in the female are the more quiet, inactive life, the greater tendency to indulge in fat-forming articles of diet, puberty and the menopause.

The indolent, sluggish, luxury and rest-loving individual is predisposed to corpulency. This fact affords a satisfactory explanation why obesity is so commonly observed among certain races—southern Italians, Orientals, South Pacific Islanders, Dutchmen and certain African races. Similarly the inhabitants of low countries of the temperate and arctic regions, living, as they do, under conditions favorable for the development of the phlegmatic tempera-

ment, are prone to abnormal fat deposition. In phlegmatic persons there is an additional factor of importance; they are quite generally inclined to consume large quantities of fat-forming substances.

Certain diseases like anemia, hydremia, chlorosis and scrofula tend to result in obesity. The reason for this is that the body lacks hemoglobin and is, therefore, incapable of oxidizing the tissues and stored-up fat in the body.

The exciting cause of obesity is the habitual ingestion of abnormally large amounts of fat-making food, and the intemperate use of alcoholic beverages, as porter, ale, beer, etc. Von Noorden states that "obesity is the result of a long continued disproportion between the amount of food consumed and that metabolized." By far the greater part of the food which is not required for the immediate wants of the tissues goes to enrich the fat deposits of the body. From this it follows that obesity may occur as the result of

1. An increased food supply with normal energy expenditure;
2. A normal food supply with diminished energy expenditure;
3. A combination of both conditions.

Clinical experience has shown beyond all doubt that when the amount of actual energy expenditure lies within the normal limits, obesity is due to a long accustomed but excessive intake of food. The amount of food consumed and the nature of that food afford valuable indications of obesity from such a cause. Such obese individuals frequently prefer fat-forming or carbohydrate food in which a high caloric value is combined with small volume.

Austin Flint used to say that he could guarantee a cure for the obese woman if he could control the key to her pantry. For the fat woman usually pretends to a seraphic existence on nothing material, and in reality she seldom sits down to a square meal, but her frequent visits to the kitchen and pantry where she languidly yet generously tastes everything in sight can account for several square meals. In this way she exceeds unwittingly her caloric requirements. A slight excess of 200 calories daily, as represented by a small piece of butter, a generous dish of ice cream, several pieces of candy, will amount to a whole lot after one year. The excess of food stored up in the fat deposits, and in a year's time the patient will have gained 11 kgm. or 25 lb. in weight.

It is the general opinion of both physicians and laymen that there are obese persons whose condition is to some extent independent of overeating or deficient physical exercise, and is rather the result of a *constitutional tendency*. Such cases cannot be brought under control through intelligent regulation of diet and exercise. Expressed in the language of metabolism, this would denote that corpulency was due to a slowing of the processes of metabolism; or, in other words, to an abnormal cellular activity inherited or acquired in after life. The abnormal condition may be advanta-

geously expressed by the much misused phrase "a slowing of metabolism." The question can only be answered by a careful, and at present somewhat difficult, investigation. Several methods\* have been suggested—namely,

1. By determination of oxygen consumed;
2. By determination of total daily exchange;
3. By determination of that diet which will serve to maintain or to increase the body weight when continued over a considerable period.

1. *The Consumption of Oxygen.*—The first estimations of this kind were carried out by Zuntz and von Noorden. They were made in regard to the consumption of oxygen upon obese persons at rest and during a state of fasting.

They concluded that the figures obtained were too high to admit of the conclusion that a diminished cellular activity exists in the obese state.

The experimental study of the influence of exercise on the metabolism of vigorous and muscular persons of obese tendencies shows that they can accomplish a piece of work with the same expenditure of energy as a healthy person. Obese persons of weak constitution utilize less economically the calories set free,—for example the amount of work accomplished in climbing a flight of steps only represented 11 per cent. of the caloric expenditure compared with 25 per cent. in the normal.

It is of special interest to note that fat persons accomplish the work of digestion with less caloric expenditure than the ordinary individual.

2. *The Total Daily Exchange.*—Under this heading only one well-conducted and complete series of experiments is on record. This work was done by Rubner. The investigator compared the total daily exchange in the case of two boys by determining their total outputs, inclusive of  $\text{CO}_2$ . One boy was eleven years of age, 135 cm. high and weighing 25.15 grm. The other boy was ten years of age, weighed 40.59 grm. and measured 136 cm. Rubner found that the obese child did not give the slightest indication of what he could term diminished vital energy; his energy exchange was even greater than that of his lean brother, and corresponded to that of a normal individual of the same weight.

From the evidence that has so far been presented, this retardation in metabolism must be accepted in spite of what has just been said. In certain cases, for example, obese persons accomplish work (and in particular the work of digestion) with less expenditure in energy than the normal individual.

The sexual life of the subject plays an important part in the development of corpulency. As has been said before, women are

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\*For complete discussion, see von Noorden's writings, from which much was drawn for this paper.



more liable to obesity than men are. St. Germain ascribed this predisposition to the repeated pregnancies that women are subject to. Bouchard found that the number of fat women was twice as high as the number of fat men.

It is the opinion of clinicians in general that castrated men (and women on whom ovariectomy had been performed) show a tendency towards obesity. For many centuries such cases have been brought forward as typical examples of corpulency of constitutional origin due to diminished metabolic activity. Loewy and Richter were the first to take up the experimental side of the question and they investigated the respiratory gas exchange in dogs, as well as in bitches, before and after castration. The amount of oxygen consumed fell 20 per cent. in the case of bitches, and about 14 per cent. and more rapidly in the case of dogs after castration. Expressed in absolute value, the total gas exchange in bitches after the removal of the ovaries fell about 12 per cent. In a later communication from Loewy on this subject, the same reduction on the original value was stated to exist after two and a half years. After that time a further diminution occurred.

It is generally accepted that disturbances of menstruation predispose to obesity. At the period of the climacteric, or 'change of life,' the most lean woman will often assume more comfortable proportions. The neck becomes stout; the double chin, significant of matronly benevolence, appears; the waist line becomes of undue latitude, and one sees the typical matron of the middle classes as she is pictured on the stage. The anatomist has ample opportunity of studying her in the décolleté gowns which she so ludicrously still assumes, out of respect (no doubt) for her more graceful years.

Besides the generative glands, the glands of internal secretion have some function in the prevention of fatness. It has been found that the administration of preparations of the thyroid gland helps greatly in the treatment of obesity, showing that the thyroid secretion influences bodily metabolism. It was demonstrated by Magnus-Levy that the therapeutic action of the preparations of the thyroid gland in reducing corpulency was due to stimulation of the metabolic processes,—that is, increased consumption of oxygen and increased output of  $\text{CO}_2$ . This has been confirmed by numerous experiments.

The idea has become universal with laymen and physicians alike, that restriction in the use of water favors the reduction of fat, and that this reducing effect is the result of an increased activity of metabolism of the fat, irrespective of the total metabolism. The fact can no longer be disputed that a moderate restriction in the use of fluid is beneficial in some cases of corpulence, but in others it is absolutely useless. Clinical teaching alone has shown that the effect produced by restricting the use of fluid is not the result of any influence which this restriction brings to bear on the meta-

bolism of fat, but depends on other causes which, although of great interest from the clinical side, do not affect the question of the metabolism of the obese.

There are symptoms of obesity exclusive of the visible rotundity of the patient. Corpulence was always considered a sign of aldermanic respectability. The "huge belly with fat capon lined," indicative of little exercise and very rich living, is not always a blessing to the individual, for it is accompanied by discomforts of respiration, circulation and general well-being.

We can divide the obese into two great groups, in considering the symptoms of this disease:—

1. The Plethoric.

2. The Anemic.

1. In this variety there is hypernutrition of all the tissues. Such patients often partake of large quantities of beer or other fluid during meals, and the appetite is abnormally keen. In addition to the excess of fat which is symmetrically distributed throughout the body as a rule, the muscles, including those of the myocardium, are vigorous and voluminous. The blood shows a condition of abnormal richness both in red blood-cells and in hemoglobin. In a number of patients, the erythrocytes were over 6,000,000 and the hemoglobin was 110 per cent.

2. The anemic type is characterized by and dependent on anemias, often of the chlorotic type. Cases of the plethoric form merge into this variety; it may, however, require many years for this. It is to be noted that while extreme degrees of the anemic form of over-fatness may be encountered, the fatty depositions do not reach the gigantic proportions of the plethoric variety. Muscular exercise is difficult and early induces exhaustion, accompanied by distress of breathing and cardiac palpitation.

In the majority of instances the blood changes are of the chlorotic type. The hemoglobin percentage varies greatly—from 33 to 83 per cent., the average being about 70 per cent. The red blood-cells are much less, and there is an accompanying increase in the number of the white blood-cells.

Mentality in general in these cases is rather slower than normal; the fat person is less critical, more amiable and usually at peace with the world. It is not he who will cause revolutions or breed discontent, and it is, therefore, no wonder that Caesar strongly objects to the lean, hungry-looking and alert Cassius.

In milder degrees of obesity the appetite is usually good. The close physiological relationship between the actual amount of nourishment required by the tissues and the amount of food desired by the appetite, appears to exist no longer. Immoderate eating and the further accumulation of fat are the results. In the advanced stages of obesity the appetite is often diminished. Nevertheless,

though the actual amount of food taken is small, the obese condition may be maintained or even increased.

The most prominent intestinal symptom of obesity is constipation and its consequences, accompanied by hemorrhoidal troubles.

In advanced cases of obesity there would appear to be a relatively abnormal deficiency of blood; that is, the blood quantity is reduced in comparison with the weight of the body. The alkalinity of the blood seems to be diminished, though the concentration of the red blood-cells usually remains normal. According to Kisch, the amount of fat is increased in the blood of an obese individual.

The urine shows some changes. The quantity may be subnormal, due to the excessive amount of sweat that the fat individual usually excretes. It was found by Levene and Letti that the ratio of total nitrogen to urea nitrogen in obese cases was normal. The uric acid and the purine bases are also in normal amounts in the urine.

Albuminuria occurs frequently in the more marked degrees of obesity, but more particularly cases of long-standing circulatory and renal disease are probably the causes of this albuminuria.

Glycosuria is frequently associated with obesity. Among every 100 diabetics, Frerichs found 15 obese individuals, Seegen found 30, Bouchard 45 and von Noorden 21.

It has been supposed that an obese patient excretes more fat from his epithelial tissues. On the other hand, Leubuscher found that corpulent persons excrete rather less than more fat by the sebaceous glands.

The treatment of obesity can be divided into four great classes:—

1. Medicinal.
2. Physical.
3. Surgical.
4. Dietetic.

I shall not enter here into a discussion of the first three methods of therapy. I will say, however, that physical exercise must always be insisted on; for there is nothing that will destroy coal like burning it, and there is nothing that will do away with fat like using it.

It is obvious from what we have learnt that the proper treatment of obesity must consist either in the reduction in the total number of calories of energy supplied in the food, or in an increase in the output of energy in the form of work, or in a combination of these methods.

An increased expenditure can be achieved by the use of suitable muscular exercises, but that method of treatment does not concern us here, and we may now direct our attention to the best means of diminishing the intake of energy in the form of food. And first one may ask, Which chemical ingredient of the food is it most important to reduce—the proteids, carbohydrates or fats? Physiological investigation has shown that all these ingredients may serve as sources of fat in the body if consumed in excess, but the



risk of proteids being converted into fat seems to be very small. As regards the relative dangers of an excess of carbohydrates or fats in the food, classical authorities on the subject are not altogether agreed, and, as we shall see immediately, schemes of diet for the obese have been drawn up, in some of which the carbohydrates have been especially restricted, while others are characterized by a limitation of fats.

The progress of research into metabolism in obesity, however, has shown that the question is, after all and as far as the mere storage of fat is concerned, one of indifference. The only essential point is to reduce the total number of calories supplied in the form of food, and whether this should be accomplished by limiting the carbohydrates or the fats, or both, is purely a matter of convenience, and one which must be decided chiefly by the tastes and the habits of each individual patient.

The next problem which presents itself, then, is, To what extent should the total number of calories in the diet be reduced? Here again, no hard and fast rule can be laid down. In some cases, such as in the very young, in whom probably a marked congenital tendency to the disease exists, it is difficult to keep the undue formation of fat in check at all. In others, such as the very old, it is probably unwise even to make an attempt, while in particular instances (for example, those in which the chief deposit of fat is in the abdomen) treatment is always peculiarly difficult. In an average case, such as is most commonly met with in the later periods of middle life, one must be guided mainly by the degree to which the obesity has developed, and in judging of this it is always better to go by the general appearance of the patient rather than by tables of height and weight.

Following the teaching of Von Noorden, and assuming that an average man of this age requires to be supplied with from 2,500 to 3,000 calories of energy daily to meet his current expenditure in heat and work, one may divide cases into three groups:—

1. Those in which it is merely necessary to reduce the diet by one-fifth, which means the supply of 2,000 calories. This can best be done by cutting out sugar, by reducing the supply of fat and carbohydrates, and by restricting the consumption of alcohol.

This plan is only likely to be successful if it can be combined with a free use of muscular exercise, and in any case the loss of weight under it can only be very slow.

2. In severe cases the diet may be reduced two-fifths, which means supplying only 1,500 calories. Here it will be necessary to reduce still further the amount of fat in the diet, and to limit the consumption of bread; and in this case also the loss of weight is apt to be slow, unless the patient can at the same time take at least a moderate amount of active exercise. Von Noorden states that he prefers this scheme to any other, because, while it usually

gives good results, it is never attended by any disagreeable consequences.

3. The third degree of diet is that in which the total calories supplied are reduced three-fifths, that is, to about 1,000 or 1,200 calories a day.

The following systems of dieting the obese are in vogue:—

1. The Harvey Banting Cure.
2. Oertel's Diet.
3. Epstein's Diet.
4. Schweninger's Diet.
5. Robin's Diet.
6. Bouchard's Diet.
7. Hirschfeld's Diet.
8. Von Noorden's Diet.
9. Karrell's Diet.

Riesman gives a comparison of the composition of the various diets:—

Diet	Protein gram.	Fat gram.	Carbohydrates gram.	Total Calories
Normal. . . . .	100	150	350	3240
Epstein. . . . .	100	85	50	1400
Harvey Banting . . . . .	172	8	81	1100
Hirschfeld				
Maximum. . . . .	134	46	122	1500
Minimum. . . . .	95	43	106	1220
Oertel				
Maximum. . . . .	170	45	120	1608
Minimum. . . . .	156	25	75	1180
Robin. . . . .	140	44	82	1290
Von Noorden . . . . .	155	28	112	1366

*The Banting System.*—This scheme of diet was first popularized by the writer whose name it bears. Banting suffered from an extreme degree of obesity, so great, he tells us, as to render him unable to tie his own shoe, and to compel him to go down-stairs backwards. Having consulted several physicians without success, and having tried the effects of violent exercise without reducing his weight, he was finally advised by a surgeon to abstain from bread, milk, butter, sugar and potatoes, which had hitherto been the main, and as he thought, innocent elements of his existence, and to adopt instead the following diet:—

Breakfast. 9 a. m.—Meat (meat, mutton, beef, kidneys, broiled fish, bacon, or cold meats) 4 to 5 oz. Tea (without sugar or cream) 1 cup. Toast (or 1 biscuit) 1 oz.

Dinner. 2 p. m.—Lean meat or fish 5 to 6 oz. Vegetables, any kind (except potatoes, carrots and parsnips). Dry toast 1 oz. Fruit (cooked but unsugared). Claret, Sherry or Madeira 2 to 3 glasses.

Tea. 6 p. m.—Fruit 2 to 3 oz. Rusk (or toast) 1 or 2. Tea without sugar or cream 1 cup.

Supper. 9 p. m.—Lean meat or fish 3 to 4 oz. Claret or Sherry 1 or 2 glasses.

On this regimen Banting lost 35 lb. of weight in thirty-eight weeks. It will be observed that the chief chemical characteristic of the Banting system is the great predominance of protein in the diet, and it has been asserted, though with only a limited degree of truth, that owing to this fact one is more likely to insure a loss of body fat alone on it, and to prevent any inroads into the muscular tissues, than by any other plan.

The chief characteristic of Oertel's system which has been largely popularized in Germany, though with some slight modification by Schweninger, is that he restricts the consumption of fat more than that of carbohydrates, and at the same time lays great stress on limiting the amount of fluid in the diet. It is adapted, of course, to German habits.

The methods of Epstein, Hirschfeld and Von Noorden are modifications of the systems of Banting and Oertel.

In drawing up a scheme of diet for the obese it is well to avoid too great variety, for that always tends to increase the appetite. For the same reason, all spices, condiments and other articles that tickle the palate, must be used very sparingly. The use of sugar should be avoided altogether and saccharin used as a sweetener instead. Visible fat should be removed from the meat, and the richer meats such as pork, goose, etc., and the fatter fish, such as mackerel, eel and salmon interdicted.

Karrell recommends an absolute milk diet, especially if edema complicates the condition. In certain cases, Karrell only administered 800 c.cm. of milk daily. Exercise should be very slight, if Karrell's regime is to be followed. Moritz recommends more exercise.

As Riesman says, "meantime nothing has been accomplished in the way of acquiring a knowledge or habit of regulation of the normal diet in order to control the body weight."

The first question to be settled regarding the use of beverages in obesity is whether or not it is important to diminish the total amount of fluid in the diet of that disease.

Exact observation has shown that the influence which the amount of water in the diet exerts upon the production or loss of fat in the body is very small in amount and uncertain in degree, and that, as a matter of fact, fat people are less affected by a restriction of fluids than are lean.

The whole question of diet in obesity is to be regarded as one affecting the technique of feeding rather than the physiological principles upon which the dietetic treatment of obesity is founded.

Unless scientific principles are followed, we usually leave our fat patient as we found him—quite fat.



## THE CONTROL OF CRIMINAL ABORTION AS INFLUENCED BY THE PRESENT WAR.

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By FRED. J. TAUSSIG, M. D., of St. Louis.

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Never before in our history has the control of criminal abortion demanded such serious consideration. The slaughtering of millions of men in the present war makes it incumbent upon us to take measures at once to replenish as rapidly as possible the waste in human material, or we shall find ourselves seriously hampered on all sides in our development. Never before have so many of our strongest, healthiest men been prevented by a premature death from propagating the race. The sickly, the degenerate, the epileptic, will at the end of this war necessarily constitute an increased percentage of the total population of the world. No wonder then that people of deeper insight look with apprehension at what the coming generations of enfeebled manhood will bring forth.

During the two decades preceding the war all the nations of Europe, with the possible exception of Russia, were alarmed at the steady fall of the birth-rate, a fall so great as in most instances to more than offset the saving of human life through improved hygiene and medical treatment. Du Moriez, on the title page of his work on Abortion, cites the following quotation of Gen. Von Moltke: "France, by her sterility, loses each day a battle." The primary cause of this sterility, he says, is unquestionably the wide prevalence of criminal abortion and its consequences.

A brief review of the various plans that have been suggested from time to time to control this evil may justify certain conclusions as to the best methods of restoring the human race to health and strength. No one but a dreamer, however, would consider it possible in our lifetime, or in that of our children's children, to completely suppress criminal abortion. Like prostitution, it will doubtless require the work of generations upon generations before its final elimination. The fact remains, however, that much important work can be done at the present time towards its effective control, work that might have been done long ago, and that will certainly result in immediate improvement. The responsibility rests upon us, fathers and mothers of the present generation, to counteract as far as possible the disastrous effects of the present war by a careful consideration and control of the breeding of the human race in the coming years. At the same time it devolves upon us to take steps that will make practically impossible such a

wholesale destruction of the best human material as occurs at present. The control of criminal abortions merely for the purpose of increasing the supply of human food for the cannons, as Du Moriez and Von Moltke suggest, will never result in any advance in the human race.

The efforts to limit the spread of criminal abortion have been directed primarily along four lines. These are

1. Legislative measures.
2. Social reforms.
3. Education.
4. Moral agencies.

Let us consider briefly the more important reforms proposed under each of these groups.

#### LEGISLATION.

I think it may safely be said that in no civilized country in the world can the criminal ply his trade with as little prospect of interruption as in the United States of America. We have but to compare the statement of Mr. Vandiver, made at a recent meeting of the New York Obstetrical Society, that in the last ten years only three abortionists in the city of New York were convicted and sentenced, and that all three were pardoned by the Governor, with the figures from Berlin where in the single year, 1895, for example, the courts obtained 96 convictions, of whom about 80 per cent. were sent to the penitentiary for from four months to a year. Increasing efforts are being made to improve our penal code so that these men and women can not in future carry on their operations with impunity. The admission of ante-mortem statements on the part of the patient will doubtless increase the number of convictions. Above all it is the commercialized agencies for criminal abortion that demand immediate control and elimination. We should not seek so much to punish the woman herself upon whom the abortion is done, as to get after the charlatan or midwife who, through advertising or other means, makes this his life work. Only too frequently we find the professional abortionist closely allied with the professional procurer.

Not merely through increased facility of conviction, however, can we hope for results. The laws must absolutely forbid advertisements that, under one guise or another, lead the woman desiring an interruption of pregnancy to the hands of those willing and anxious to commit the deed. Publicity is a means of spreading evil as well as good. It is the duty of public officers and legislators to see to it that these means of public communication (the newspaper, the letter, the leaflet) are kept within channels that can do no harm.

Another agency in commercialized abortion is the manufacturer

and trader in instruments employed for the interruption of pregnancy. Laws should be made and *enforced* that will get after this important source of trouble. Here again Germany has taken the lead, and it would be well for us to follow in her footsteps. Some writers would have us be equally insistent in regulating the sale and exhibition of instruments used in the prevention of conception. These argue that it is but a short step from using instruments to wash the sperma from the vagina to using instruments to wash the ovum from the uterine cavity. There is not time here to go into this very interesting and important phase of the subject. That parents should be able to control, to some degree, the number and time of their offspring without the necessity of complete celibacy would seem a perfectly just demand. It is hardly fair that, because these instruments are at times used for illegitimate purposes, laws controlling their employment should be so severely worded and so loosely enforced as they are in this country. No wonder other nations regard us as hypocrites in all matters when we show this trait so decidedly in some of our sex legislation. Personally I trust the time will come before long when public opinion will permit individuals openly to carry on such limitation of their offspring as they now pursue by stealth and in secret. The state has other means of controlling the birth-rate beside such futile laws. These I will consider under the head of Social Reforms.

Laws have also been drawn up requiring physicians to notify the authorities in every case of criminal abortion in the hope that thereby more cases would be uncovered. Such laws, however, are not an unmixed blessing, because they tend to make the women who have committed such actions upon themselves prefer to get along without treatment or with only the care of some untrained person, rather than have the fact of their offense become a matter of public record. A more rational procedure is to have not merely the criminal abortions but all abortions become a matter of public record. I suggested this some six years ago in my monograph on abortion, and since that time von Winckel made a similar suggestion in Germany. I have no delusions as to the difficulty of carrying out such a plan, particularly in this country where only about two-thirds of the full-term births are as yet recorded. In countries such as Germany, however, where the control of the state over the individual is more powerful, we may expect before long, particularly at the conclusion of this war, to find that registration of all abortions will be made compulsory. It is the duty of the state to exercise a certain supervision over the death of every individual, and in case the circumstances of the death are suspicious, to institute an investigation. Such a duty, however, should go beyond the time when the child is expelled from the mother's womb to its logical beginning in the first month when conception occurs. Just



as the necessity for burial certificates is a powerful agent in uncovering murders, so I believe the registration of all abortions would serve in many instances to expose criminal procedures and in addition the fear of being caught and punished would prove a strong deterrent.

#### SOCIAL REFORMS.

Probably the two most important factors in instigating criminal abortion are illegitimacy and poverty. These are not matters for laws to regulate but are dependent rather on social conditions and can be alleviated only by appropriate reforms. Something, to be sure, has been done in recent years toward the care of the illegitimate mother and child, but public opinion still points the finger of scorn at her and her offspring. It is high time that we realized that such a mother has through childbirth suffered sufficient punishment. The fate of these outcast mothers, compared with that of those women who committed abortion when illegitimately pregnant and still remain honored members of their community, has led many a woman to follow the latter path. Institutions for the care of such mothers and their offspring should receive the hearty support of the community and seek to overcome these still existing prejudices. In so far as illegitimacy results from the insufficient wages of women, we must do all in our power to see that their wages are raised. Equal suffrage would doubtless be a great factor in accomplishing this end.

Poverty as a factor in criminal abortion is a problem requiring careful study. What one person would call poverty another might term comfort. The Mongolian can subsist upon practically nothing. The foreigner is content with a mere pittance as compared with the average American workingman. It is proverbial that large families are found among the poor rather than the rich and that largely as a result of this the poor grow poorer and the rich, richer. To even things up, the state should through its system of taxation throw the heavy burdens upon the unmarried and those with no offspring or but one or two children. This would be but an extension of our graduated income tax. Families with more than three children should receive additional benefits in the way of pensions, increased opportunity for employment, etc. At present the burdens are placed unfairly and doubtless are a considerable factor in inducing many a parent to resort to criminal abortion in order properly to care for the children already born.

#### EDUCATION.

Ignorance is unquestionably an important factor in the spread of criminal abortion. As in similar medical and moral reforms, much can be gained by a proper education of the public, but this is always

a very difficult undertaking. At best only a small proportion of the public can be reached by the methods at our disposal, and even these must be told the facts again and again before it seeps into their consciousness.

The most essential fact for all women to realize is that life begins when the male and female germ-cell unite and that in the interval of but a few weeks sex is determined, all the important parts of the body are formed, and its shape already outlined. Human embryology and anatomy should be taught in the public schools and the important facts of pregnancy given in a course of sex instruction to small groups of girls. A full realization of early fetal development will keep many a young mother from inducing an abortion at this time by showing her that it is really a child and not a piece of unformed flesh that she is sacrificing.

Another safeguard against criminal abortion is to inform women of the serious physical dangers involved in the procedure. Just as the fear of syphilis and gonorrhea has kept many a man from straying from the 'straight and narrow path,' so the fear of blood-poisoning has restrained many women from having their pregnancy artificially ended. The uncertainty and dangers of taking any abortifacient drugs should also be explained. This restraint is less felt by the unmarried woman who ordinarily cares more for her social position than her life. Women often hear of some friend who had had an abortion done and was up and around in two or three days without any ill effects. Not realizing that they themselves may not be so fortunate, they have the abortion done only to suffer excruciating pains, if not death, followed by an invalidism that often requires an operation for its relief. Many such a patient will bemoan the fact that she was kept in ignorance of all these dreadful consequences.

Far too often and without due consideration do physicians warn against pregnancy. DeLee echoes general experience in recording numerous instances where women had an abortion committed because they had been wrongly told by some doctor that they could never give birth to a child without a serious operation. Women should be told the fact that the death-rate from abortions is about five times as great as that from full-term pregnancies. Not infrequently women have imbibed these wrong ideas concerning the perils of childbirth from the experiences of some relative or friend. By clearing up these false notions we can often alter the intentions of the pregnant woman. At any rate it is the duty of every physician who suspects that his patient is planning to interrupt a pregnancy, to explain to her in detail all the essential dangers involved in such a procedure. Even if we save but a small percentage of women by such measures, it is well worth the attempt.

## MORAL AGENCIES.

If the control of criminal abortion were essentially a question of public hygiene and sanitation as is the control of yellow fever, or typhoid, the problem would be comparatively simple. But this destruction of human life is closely bound up with our whole moral and religious make-up. To effect its control even in part, therefore, we must try to build up the ethical and religious ideals of the community. Laws, institutions, education, are of no avail, if the public do not obey the laws, or sustain the institutions, or listen to the words of knowledge. Criminal abortion will not be abolished until public opinion demands it. As long as the masses consider it lightly and desire the abortionists to escape punishment, no progress will be made. As long as women care more for their personal comfort than they do for their duty as mothers of the coming generation, criminal abortion will flourish. It is for this reason that we must constantly appeal to the higher ideals of men and women.

Such an appeal is made most directly and to the largest number of people through their religion. In spite of all the hypocrisy and sham that surrounds it, the orthodox church has unquestionably in the past exerted a powerful influence in the right direction. Some unkind critics have maintained that the motives of the church in this regard were not entirely disinterested, since it was clear that the strength of the church depended largely upon the number of offspring born to its adherents. Be that as it may, the orthodox church has been an important moral stimulus to the masses, and will continue for some time to exert such an influence. Yet the failure of orthodoxy always to live up to its statements, the politics and greed that have enmeshed themselves into its constitution, have also made it to some extent a factor for evil. It is not surprising, therefore, that criminal abortion is just as frequent in orthodox Austria and Russia as it is in liberal Germany and England.

The power of orthodox religion, moreover, is waning. It is distinctly less than it was before the French Revolution. Since that time there has arisen among the masses an ever growing distrust of creed. The increasing power of socialism, on the other hand, is recognized in every civilized country. Upon the proper development of these socialistic ideals will depend very largely the whole problem of criminal abortion. One group of socialist women claim that they have an absolute right to do as they choose with the products of their body and brook no interference by the state. If they do not care to shelter the child growing in their womb, it is for them alone to decide upon its expulsion. This extreme doctrine runs counter to all our ideals of humanity. Its parallel can only be found among the lower animals. It is, if anything, more brutal than placing the new born child out in the cold night air of winter to shift for itself.



This extreme view cannot, however, be said to be characteristic of the socialist body. By far the majority have high ideals for the future of the race. While many of them favor employing means for the prevention of conception, they are as a whole opposed to the interruption of pregnancy except for special indications. Having many of them suffered from the poverty attendant upon large families, they naturally desire such reforms as will lighten the burden for these parents. In so far as socialism is teaching men and women to think more deeply concerning the problems of the propagation and welfare of the coming generation, it is unquestionably an important factor for good. The great obstacle to all important reforms is the indifference of the unthinking multitudes that live on day by day breeding or aborting without any care higher than their own immediate comfort. The study of eugenics is still in its infancy. Let us also remember, that while the quality of birth is important, quantity is likewise an important factor. The birth-rate should be the highest possible one, consistent with the proper development of the individual.

The final solution of the problem lies in a constant effort to raise the ethical ideals of the multitude. In the meantime, however, we should help along those reforms of legislation, social conditions and education that will do much in our own day and generation to lighten the extent of this evil and work for greater happiness and health.

## HOW CAN WE MEET THE PROBLEM OF THE DEAF?\*

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By HAROLD HAYS, M. D., F. A. C. S., of New York,

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The specialized branch of medicine, otology, has made enormous strides during the past twenty years. Operative procedures are skilfully carried out; the pathology of the ear has been thoroughly investigated; the etiological factors which cause most of the ear troubles have been traced; and accurate diagnosis of labyrinthine conditions has become a possibility. Yet with all this great advance, the treatment of the causative factors and the resulting conditions of deafness have come to a standstill. Von Troetsch declares that every third person between twenty and fifty years of age is more or less deaf in one ear, and it is conservatively estimated that at least 100,000 persons in New York City are suffering from deafness. It would seem reasonable to suppose, therefore, that this subject should have received most thorough investigation and that we ought to be in a position where we could offer some hope to the majority of individuals who apply for treatment.

It is perhaps unfortunate that the pathological study of deafness cannot well be undertaken, mainly for the reason that deafness is very seldom the primary condition but is secondary to disease in other parts. This causes a mechanical displacement in the minute organs, which allows of the proper interpretation of sound waves. Moreover, the average person does not realize that he is becoming hard of hearing until certain subjective symptoms occur, such as tinnitus and dullness in the ears. By that time certain definite physical changes have taken place within the middle ear cavity which are hard to correct.

It is no compliment to the specialty of otology that so little advance has been made along the lines of treatment in progressive deafness. Many men are perfectly content to go through a thorough examination with various tuning forks, etc., which in the end determine them in the feeling that they are helpless and that it is their duty to tell the patient that he is suffering from a progressive malady which makes his life one hell on earth. I believe that such an attitude on the part of the otologist is inhuman and can only be forgiven if he personally feels that he is incompetent to manage the case.

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I do not hesitate to say that although the majority of cases of progressive deafness are discouraging to treat, yet persistent efforts many times increase the hearing acuity, if only by stimulating the patient in a psychological way. We all know that one of the greatest misfortunes of deafness is that the patient finally gets to the stage where he thinks it is hardly worth while to try to hear, the result being that his auditory nerve, figuratively speaking, becomes atrophic from disuse. Moreover, it is a known fact that if the nerve is re-educated either by changing the psychological aspect of the patient or by lip-reading, the hearing becomes far more acute. Is it not right under these circumstances that we exert ourselves a little bit further to help these people?

The otologist's duty towards the hard-of-hearing does not cease when he has done all for his patient that he can in a medical way. These patients are peculiarly sensitive and react readily to suggestions given them. It is, therefore, incumbent upon the physician to get at their social and economic lives and to attempt to encourage the patient both in his business and social life. One has only to hear the plaint of the man who has been well able to support a family for years, and then on account of his hearing infirmity loses his position.

We should be as much interested in the social and economic welfare of the deaf as we are in the treatment of their disease. At heart we are humanitarians and are placed on this earth to aid and to protect the individual as well as society as a whole. It is important to attempt to cure deafness, but it is just as important, in the meantime, to aid the individual to attain a certain degree of happiness and usefulness.

#### THE MEDICAL PROBLEM.

The treatment of deafness in the years to come must be attempted along more rational lines. The otologist must understand that in the majority of cases he is dealing with a physical process, and he must interpret the change which has taken place in each individual case and treat the case accordingly. Empirical methods of treatment such as continuous inflation of the ears by the Val-salva method or through the Eustachian catheter are things of the past. No matter what degree of deafness has been attained, it is absolutely necessary that one bear in mind the causative factors of the condition and eliminate them if possible.

Let us for a moment consider the simple mechanism of the middle ear. On one side of the cavity we have the ear drum, on the other three sides we have bony walls. On the internal wall is the foot plate of the stapes, held in place by the ligament of the oval window. At the antero-inferior angle is the entrance of the Eustachian tube. The transmission of sound waves is accomplished by



the vibrations of the drum, which vibrations are sent through the small ossicles until the labyrinthine fluid sends its interpretation to the auditory nerve. In order that the proper transmission of sound may take place, nature has decreed that the same atmospheric pressure must be maintained on both sides of the drum. If for any reason any inflammatory condition of the Eustachian tube takes place, the normal atmospheric pressure is disturbed. Such a disturbance sooner or later will result in deafness; for as the air in the middle ear cavity becomes rarefied, the drum begins to retract, on account of the pressure in the ear canal; and sooner or later adhesions take place in the ossicular joints. If such a condition is found out early, it frequently can be rectified; but if left too long, certain changes take place in the position of the foot plate of the stapes and sooner or later the ligament of the oval window loses its tension. Sound waves still reach the internal ear, but they must be more forcible in order to produce an impression. From this simple explanation one can readily understand that proper ventilation of the Eustachian tube is most important in the prevention of deafness.

In meeting the problem of deafness and its prevention, it is most necessary that one go back to early childhood to correct conditions that frequently exist at that time and which are undiscovered. Many a child who is considered stupid in school is only stupid because he is unable to hear as well as other children. The examination of the ears of school children is just as important as the examination of the eyes, for only in that way are we able to act fairly towards many children who up to the present time have been considered hopelessly stupid. I believe that the hearing of every child should be frequently tested and if any suggestion of deafness is present the child should at once be taken to a competent otologist.

Among the many causes in early life which lead towards progressive deafness may be mentioned the following: (1) Acute suppurative conditions of the ears which have subsided; (2) hypertrophied tonsils and adenoids; (3) subacute and chronic infections of the nose and nasopharynx; (4) unusual conditions.

(1) Realization that acute suppurative otitis media is a serious condition that demands immediate attention is so well recognized to-day that very little comment on that score is necessary. However, the majority of persons, and I am sorry to say physicians, too, are perfectly satisfied when the acute symptoms are over and the discharge has ceased; but it is seldom appreciated that these little organs have gone through an acute process which is liable to cause a great deal of anxiety later on. Does one realize that very often adhesions take place in various parts of the middle ear or that the drum itself may undergo degenerative changes? In

every instance of this kind, if one has the welfare of the child at heart, he will examine that child's hearing as well as he can, and if he notices any tendency towards a diminution in hearing he will immediately attempt to relieve that condition as well as possible.

(2) The rôle that the tonsils and adenoids play in the causation of ear infections is well known to-day. Tonsils cause trouble not only by their enlargement and interference with the tubal muscles, but very often when they are small they cause a chronic infectious condition which is very liable to extend its influence into the Eustachian tubes or middle ear. Adenoids aside from causing nasal obstruction will frequently extend into the Eustachian tubes sufficiently to close them off. Once the normal pressure within the middle ear is diminished, the possibility of deafness is very apparent. The size of the adenoid is not of as much importance as its location, and small fringes of this tissue residing in the tubal orifice, or in the fossa of Rosenmueller can do a great deal of damage. It is an axiom from which I seldom vary that adenoids should surely be removed at the first intimation of ear trouble, and that under all circumstances they should be removed when they cause nasal obstruction and chronic infection of the nose and throat. As I consider the importance of tonsils in inverse proportion to the age of the child, I believe it is a wise policy to remove them in early childhood only when there are definite reasons for doing so.

(3) It is surprising to see how frequently parents will allow their children to go on year after year with chronic or subacute infections of the nose. We are beginning to realize more and more that these infections frequently arise in the sinuses, and that the constant discharge of pus or muco-pus in the nasopharynx will give rise to an inflammation of the mucous membranes in this locality which can extend to the ears. Not only does this inflammation cause a closure of the Eustachian tube, but such children are never taught to blow their noses properly, with the result that they are constantly forcing air through a narrowed tube. A relaxation of the drum frequently takes place as a result of this—the condition which I have termed pocket handkerchief deafness.

One must prevent as quickly as possible the continuance of such a condition. This is best accomplished by the proper care of the nose. Severe measures in the treatment of children often cause more harm than good, but simple remedies will often accomplish a great deal. If tonsils and adenoids seem to cause obstruction and prevent drainage of the nose, they should be removed. If the mucus or muco-pus is tenacious, the nostrils should be cleaned out with a warm solution of boric acid or bicarbonate of soda, the medicine being instilled with a dropper so that no force is used. This can often be followed by instillations of drops of argyrol,



which although not an antiseptic will frequently have a stimulating effect on the mucous membranes and act as a preventive of further infection. Such children should be taught to blow their nose properly, that is by holding one nostril at a time, or by blowing into the handkerchief without holding the nose at all.

Although in many instances no definite evidence is obtainable that there is an actual deafness in childhood, yet the etiological conditions as outlined above are frequently present. Among unusual conditions that tend towards deafness are hereditary influences, infectious diseases, traumatism, tumors, etc. These need not be mentioned further here.

As the child reaches the stage of puberty, certain changes manifest themselves in the mucosa of the nose and throat, mainly in the increase of erectile tissue. At such a time the swollen mucous membrane may lead into the Eustachian tubes, causing stenosis. It is particularly important that a child at this age be looked over carefully, and that proper attention be given to the nose and nasopharynx. One important factor upon which not enough stress is laid is the proper blowing of the nose. If children, as well as adults, get into the habit of blowing their noses too forcibly so that infected mucus is sent up into the Eustachian tubes, sooner or later the hearing mechanism will be impaired. Patients should be taught to blow only one nostril at a time, or to hold the handkerchief loosely below the nose and not to hold the nose at all.

When we come to the treatment of the adult hard-of-hearing we find that we are up against a complex problem. It is extremely difficult to get the co-operation of our younger patients, who although the hearing is impaired, very evident by the tests which we make, are still able to hear well enough to rest content. It is just at that stage that proper treatment can accomplish a great deal, but our young friends find it a nuisance to come to the doctor's office regularly or else are kept from coming by the numerous activities in which they are engaged. This is particularly so among the young people who do not have to earn their own living. The wage earner begins to understand early in life that deficient hearing handicaps him in the struggle for existence.

Before attempting to tell you what can be done at this stage, let me say that it is extremely unfortunate that the poorer class of people, who certainly deserve as good service as our wealthy patients, are placed in the unfortunate position where the treatment which they receive at the various hospitals is not only useless but frequently harmful. In these institutions the physicians are unable to treat such a vast number of patients conscientiously; therefore, the patients not only suffer from harmful treatment or lack of treatment, but are kept from getting the treatment they ought to have and which would be given them in a great many in-



stances if they were treated privately. In the year 1912, 5,542 middle ear cases were treated at one of our large hospitals, of which number 1,531 were suffering from progressive deafness. Most of these cases returned for treatment once a week which meant thousands of treatments a year. One can readily understand how impossible, under such circumstances, it is to give every patient the time that is necessary for proper treatment. It is again unfortunate that a great many of these patients could afford to go to the private office of a physician and pay a moderate fee. If they did so, just so much more time could be given to those who deserve charity.

What can be done to improve deafness? The primary consideration is the correction of those conditions which have caused the trouble. Etiological factors will be found in the nose and throat, such as a deviated septum, hypertrophied turbinates, polyps, hypertrophied tonsils, suppurative conditions of the sinuses, etc. However, as a rule, when the patient reaches you, the mischief has been done, so that not only must the causative factor be corrected but the ear itself must be properly treated.

Too much attention has been given to the refinements in technique for the testing of hearing. If the otologist would spend more time in interpreting the trouble in each individual case and less time in making tests of hearing, he would do a great deal more for his patient. Personally I am more interested in the expression of opinion from the patient as to the condition of his hearing than I am in the interpretations from my tuning forks. Our object in attempting to improve the hearing is to establish the normal social and economic status of our patients and nothing short of that should satisfy us. It is very little comfort to the patient if he is told that he hears the high forks better than he did. What he desires is an improvement which is appreciable on his part.

Realizing the important element of tubal ventilation in cases of progressive deafness, I have confined myself in many cases to determining the patency of the Eustachian tube and have attempted to establish proper air pressure in the middle ear. The mere inflation of the Eustachian tube through the catheter accomplishes very little. For the time being the ear is properly massaged, but when the patient leaves the office he is frequently as badly off as ever. In order to establish the patency of the tubes, one must attempt to remove the inflammatory process present, and after this has been accomplished he must keep the tubes properly dilated by the frequent insertion of suitable sounds and bougies. The mucosa of the tube is first shrunk with cocaine and adrenalin, and then the bougie is inserted beyond the isthmus of the tube into the middle ear and allowed to remain in place for half an hour to an hour. When the bougie is removed, one may inflate the ear with the utmost gentleness in order to assure himself that the tube is patent.

Forcible inflation at such a time would result in a complete relaxation of the ear drum and ossicular chain—a condition that I shall refer to later. I have used this method hundreds of times and in no instance have I seen an untoward result.

A few years ago I described a condition which I termed pocket handkerchief deafness. The condition actually is a relaxation of the drum and chain of ossicles, caused by improper blowing of the nose, or by too forcible inflation of the ears, or by the constant use of the Valsalva method of inflation. In many of the cases the original process started in the Eustachian tube, but as time went on, for some reason or other, a positive pressure of air was maintained within the middle ear so that the drum was forced outward and had become relaxed as the absorption of air took place. The condition can be observed by noting the vibrations of the ear drum through an electric otoscope attached to a pneumatic massage apparatus. I believe that at least 50 per cent. of the cases of deafness that come to the otologist for treatment have this condition present, and this is particularly so in those cases that suffer from what we call paracusis. The treatment of such a condition is extremely difficult and taxes the patient and the physician. In certain instances I have been able to increase the tension of the ear drum by the constant application, over a prolonged period, of a preparation of cantharides collodion, after the method of Heath, of London. However, a great many of these patients have got to the stage where the ossicular chain is hopelessly deranged, and it is only after prolonged efforts that one is able to meet with any success.

#### SOCIAL AND ECONOMIC PROBLEM.

However, the physician's duty does not cease with the medical treatment of this condition. There is a vast social and economic problem and incidentally an educational problem which must be met. Although deaf-mutes are perfectly willing to fraternize, the hard-of-hearing attempt to conceal their infirmity and, therefore, are unwilling to co-operate with one another. It is the duty of the physician to let his patient know that the only way that anything can be accomplished in meeting this problem is by helping his fellow-sufferers. Deafness is not a condition to be ashamed of, and yet it is surprising to see how many hard-of-hearing people are perfectly willing to admit that they are ashamed of their infirmity. It is perhaps unfortunate that the world at large has little patience with the hard-of-hearing person, and that as an economic factor, he is cast out of reckoning. Nevertheless, it is important that the individual problem be met, and in order to indicate to you how it can be met, let us understand what has been done.

*Education of the Deaf.*—To-day the education of the deaf is a problem that is receiving a great deal of consideration. The instruc-



tion of a deaf child should be begun at the earliest possible moment, and should be encouraged or conducted by the mother or a suitable teacher. School instruction may be got later on in specialized schools, but under no circumstances should the deaf child be made to appreciate his condition and be neglected. If he is taught properly, he learns to speak readily and very often becomes a proficient lip-reader. If he is not taught properly, he becomes stupidly imbecile. The problem has been met to a great extent by the Board of Education in this city by segregating the hard-of-hearing children in a special school under the care of proficient teachers. Miss Cairns, the principal of the school, has accomplished wonders, and one has only to visit her school to appreciate what it means to these little ones.

Instruction in lip-reading for adults is extremely important. The psychology of deafness is a complex question, but it is a well-understood fact that lip-reading increases the acuity of the auditory nerves. Schools such as the Wright Oral School, the New York School for the Hard-of-Hearing under Mr. Nitchie, etc., have turned out very apt pupils, many of whom have themselves become teachers in lip-reading, and by their example have shown others the immense benefit to be derived from such schooling. Lip-reading is a science by itself, in fact is a new language and cannot be learned in a short time. Moreover, one must have continual practice in order to keep himself perfect. It is, therefore, absolutely necessary that classes of lip-readers be formed. In order to illustrate the immense value of lip-reading I can do no better than to state that certain lectures were given at the Museum of Art this winter under the auspices of the New York League for the Hard-of-Hearing. These lectures were conducted by a deaf person and almost all the audience was deaf. They received their instruction by reading the lips of the lecturer. One of the most important branches of the New York League for the Hard-of-Hearing, of which I have the honor of being president, is the establishment of scholarships in lip-reading. We usually have a number of applications pending for these scholarships, and within the past year we have managed to establish a night-school class, under the direction of Miss Samuelson, which is working out very successfully.

*Economic Problem.*—Probably the most important problem that confronts the deaf person is the maintenance of his present employment or his attempts to get a new position which will conform to his infirmity. One can hardly realize what it means to a man who has raised a family and who has lived comfortably for a number of years to lose his hearing gradually and find that he is considered a negligible factor. For example, a few years ago a man came to me who had been earning a salary of about fifty dollars a week as an insurance agent. He lost his hearing, and, therefore,



lost his job. He walked the streets day after day trying to find some honest employment, but was unable to do so. His wife and child were starving. Medically nothing could be done for him, and at last he became a hopeless derelict. Is it fair that society should cast such a man aside and not give him an opportunity to earn an honest living? A second man came to me a number of years ago who had been happy on a salary of thirty dollars a week. His hearing gradually became worse and his salary was reduced to fifteen dollars a week. Finally he was discharged. When I saw him the other day he informed me that he had made seventeen dollars during the past year. Here was a man in the prime of life, perfectly honest and willing, and yet thrown off by the efficient economic world, because he was not up to standard. Again I ask you whether it is fair? Yet how many of you would take a deaf cook into your house? How many of you would employ a hard-of-hearing nurse? How many of you would be satisfied to be inconvenienced by having any deaf person around? Yet such people must live, and it is necessary for the physician and for those who are working along the lines of social service to find out the usefulness of hard-of-hearing individuals.

Within the past few years two organizations have been started in this city which have attempted to study these problems and solve them if possible. I refer to the Society for the Welfare of the Jewish Deaf, which works mainly among deaf-mutes, and the New York League for the Hard-of-Hearing, whose main problem is to help the hard-of-hearing. The first Society has been successful, under the able leadership of Mr. Amateau, in finding positions for a number of their applicants. Most of these positions have been poorly paid. Yet it is something to have succeeded in finding suitable trades for the deaf-mutes. Last year certain deaf-mutes established The Communal Press, which does job printing. The deaf-mute is also an excellent linotype operator and, therefore, has found his position in the printing room of the large newspapers.

In dealing with the hard-of-hearing the New York League of the Hard-of-Hearing has a difficult problem to solve. One must remember that the majority of applicants for employment have already become accustomed to a certain trade, and it is very difficult for them to start in in adult life to learn something new. Yet it is impossible to suit everybody, and the unfortunate must in some way accommodate himself to this changed condition. Some of the cases are very distressing. Only the other day a nurse at the New York Eye and Ear Infirmary was referred to me, who felt it her duty to give up her position on account of her hearing infirmity. She had applied to the League for work. What kind of work is suitable for a girl who has been trained in nursing? At what kind

of work could she possibly be happy after having devoted all these years to one special thing?

But the League does manage to accomplish certain things, and in order to give you an idea of the happiness we have given certain individuals I desire to read to you the following little statement made by one of the applicants. It expresses better than anything I know the feelings of the hard-of-hearing individual.

"I was having one of my 'bad' days. From a sunny, sweet-tempered, cheerful little person, I had lapsed into a moody, self-absorbed, irritable woman. When I was not displaying any of the unpleasant characteristics just mentioned, I was so melancholy and apathetic, that it seemed nothing could arouse me.

" 'Dame Care,' it is true, had heaped many troubles on my young shoulders, but the one I found hardest to bear was my deafness. Because of it I shunned people. I wanted to be left alone. Nothing interested me. Even at night, after I had fallen asleep, there was no relief, for almost invariably I would dream that people were shouting at me and gesticulating wildly, and I was terrified because I did not know what they were saying. So it was no wonder that my 'bad' days came frequently.

"I was startled in the midst of my brooding. Mother laid a kindly hand on my shoulder and pointed to an article in *'The World'* referring to the League. She suggested that I write for particulars. I shook my head. 'I'm not interested,' I said, listlessly. I was wishing, somehow, that I could cry. It would be such a relief, I thought; but the soothing tears would not come.

" 'Just do this thing to please me,' mother begged. 'It really may be something worth while, dear.' In a rather hazy sort of way I felt sorry for her. So I nodded my head absently.

"That seemed to give her a little hope. She left me, and in a little while returned with pen, paper and ink. 'Write at once,' she urged.

"Can anyone understand, I wonder, just how I felt when, within the course of a day or two, a letter came to me from the Secretary of the League—a letter so sympathetic—so understanding; it showed such an 'eager-to-help' spirit. Why then something surged within me and I cried. I was grateful for those tears, and most of all, for that letter. It seemed to open up a way for me to pass through a better and more useful life—all in a flash I seemed to realize that despite my affliction there were things in store for me that I had never dreamed of. I was not really meant to be a shut-out from society. I was not to suppose that I could never make use of my ability to earn money to support my child and myself. Why—why, there were lots of things in this world to live for.

"And poor Mamsie—she was so overjoyed, too.

"Through the efforts of the League I was able to take lessons in

lip-reading. That has meant more to me than I can possibly make anyone realize. I no longer shun people. I no longer am nervous and self-conscious when folks talk to me. I do not claim to always understand everything that is said, but I do get along so much better now than I ever did since my hearing became defective.

"And the social life at the League has meant so much—so very much to me. I'm so cheerful and lighthearted now that my old friends are most agreeably surprised at the change in me. It has changed my whole attitude towards life.

"The typewriting work, too, that I have been able to obtain through the League has been the means of propping up my head again. I shall never forget how utterly impossible this all looked to me such a short time ago, and now——

"If I could only cry this aloud from all the housetops!"

I believe that it is part of the physician's duty to educate people to the fact that the deaf person deserves a certain amount of consideration, and that there are certain trades in which he is extremely useful, if the innate prejudice against him is finally overcome. The deaf individual makes just as good a book-keeper and stenographer and certainly could be useful as a librarian. Why not give such an individual the opportunity to show what he is worth?

There is another duty that devolves upon the physician and that is the education of the deaf to the wearing of ear phones. Of course, every deaf person thinks that he becomes extremely conspicuous when he wears such a machine, and it is hard to overcome the prejudice that he has for a hearing instrument. I frequently contradict such prejudice by stating that when people first began to wear spectacles they were laughed at, and that the first man who raised an umbrella over his head was hooted out of town. I have no doubt that if I had worn conspicuous glasses over my eyes a few hundred years ago, I would have been ashamed to have had people see me. Yet such things as eye glasses, and umbrellas are no longer conspicuous because they are commonly seen, and I believe that the time will come when the hearing instrument will be so commonly used that the prejudice will be overcome. When such a time does arrive the hard-of-hearing person will not be as badly off as he is to-day. The electric ear phone not only aids the hearing because of its magnification of sound, but it continually stimulates the auditory nerve, and the hearing actually has an opportunity to improve. Again I say that I believe it the duty of the physician to overcome this unwarranted prejudice.

How shall we meet the problem of the deaf? From these few fragmentary remarks one can see that the duty of the physician has not stopped when he has examined the patient professionally and done what he can for him in a medical way. The vast educational, social, and economic problem confronts us, and again I repeat that



as humanitarians, who come more closely in contact with this class of people than any one else, it is necessary for us to use our influence to see that these people receive all that is due them. If the otologist sees the patient only from a narrow point of view, the family physician, who comes more closely in contact with patients than anybody else, is forced into the position where his efforts in the proper direction may cause more permanent happiness or undiminishing sorrow.

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## STUDIES ON SULPHUR METABOLISM.

## III. A Study of the Ethereal Sulphates of the Urine in Various Diseases.

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## I. INTRODUCTION.

In a previous paper<sup>1</sup> I have presented a review of the present conception regarding the significance of the ethereal sulphates of the urine. This paper contains a study of the ethereal sulphates of the urine in certain rare diseases and in a series of cases of certain chronic and common pathological conditions.

The plan of the experiments and the methods of analyses were the same as described in the previous paper. The tables on following pages contain the results obtained in this study.

## DISCUSSION OF TABLE NO. I.

Of the various diseases represented in this table the only one associated with the excretion of increased amounts of ethereal sulphates are Cases No. 11, (syphilitic hepatitis<sup>2</sup>) and No. 15 (chronic myocarditis). This case on a day preceded by constipation showed an increased excretion of ethereal sulphates. Case No. 13 (cholelithiasis with biliary fistula) is of considerable interest. It may be noted that although considerable bile was lost from intestinal digestion, the ethereal sulphates are normal, showing that the intestinal putrefaction was low in spite of the small amount of bile secreted into the intestines.

## DISCUSSION OF TABLE NO. II.

The ethereal sulphates of the urine were not found to be continuously increased in the cases of myasthenia gravis, myotonia congenita, and family periodic paralysis that were studied. They all show occasional increased excretion of ethereal sulphates in the urine on the days of constipation.

## DISCUSSION OF TABLE NO. III.

The only diseases in the series of cases in this table, showing a persistent increase in the amount of ethereal sulphates excreted in the urine is Case No. 25, a case of carcinoma of the lower jaw, treated with external applications of radium.

TABLE No. I.—THE ETHEREAL SULPHATES OF THE URINE IN CERTAIN CHRONIC DISEASES.

Case No.	Date.	Total Sulphur.		Total Sulphate Sulphur.		Ethereal Sulphate Sulphur.		Inorganic Sulphate Sulphur.		Ethereal Sulphate Sulphur in Per Cent. of Total Sulphate Sulphur.	Diagnosis and Remarks.
		gram.	Per Cent. of Total S.	gram.	Per Cent. of Total S.	gram.	Per Cent. of Total S.	gram.	Per Cent. of Total S.		
1.	6/30	1.13	29.1	0.33	7.0	0.08	22.0	0.25	24.2	Chronic interstitial nephritis. Mag. sulph. given. Chronic interstitial nephritis. Fracture of ribs with pneumonia.	
2.	7/24	0.81	83.7	0.68	7.4	0.06	76.3	0.62	8.8		
3.	8/8	0.66	84.7	0.56	8.9	0.05	85.8	0.50	10.5		
3.	8/10	0.63	85.2	0.54	5.1	0.03	80.1	0.50	5.9	Chr. parenchymatous nephritis.	
3.	8/12	0.74	73.1	0.54	5.4	0.04	67.7	0.50	7.4		
3.	8/20	0.87	83.9	0.73	5.4	0.04	78.5	0.68	6.4		
4.	7/29	1.98	59.1	1.17	3.9	0.07	55.2	1.09	...		
5.	8/14	1.13	97.5	1.10	5.0	0.05	92.5	1.04	5.2	Chronic lead poisoning. Mag. sulph. and potass. iodide treatment.	
5.	8/16	1.46	93.8	1.37	3.6	0.05	90.2	1.31	3.9	Chronic lead poisoning. Mag. sulph. and potass. iodide treatment.	
5.	8/17	1.22	87.4	1.07	2.5	0.03	84.9	1.04	2.8		
6.	8/4	0.95	92.5	0.88	2.6	0.02	89.9	0.85	2.8	Bronchial asthma. Epinephrin and KI given.	
6.	8/5	1.17	93.1	1.09	2.1	0.02	91.0	1.06	2.2		
7.	6/27	0.74	70.9	0.53	6.7	0.05	64.2	0.48	9.4	Chronic appendicitis one week after operation. Clinically gastric carcinoma; operation showed chronic appendix.	
8.	7/5	0.28	77.5	0.22	7.1	0.02	70.4	0.20	9.1		
9.	7/8	0.39	89.9	0.35	10.9	0.04	79.0	0.31	12.1	Hepatic abscess. Syphilitic hepatitis. Carlsbad salts given.	
9.	7/10	0.24	87.1	0.21	14.5	0.03	72.6	0.18	16.7		
10.	7/26	0.55	79.7	0.44	9.1	0.05	70.6	0.39	11.4		
11.	7/25	0.60	82.7	0.50	18.3	0.11	64.4	0.39	22.0	Perihepatitis at operation. Bile in urine. Carlsbad salts daily. Urine free from bile.	
11.	7/26	1.01	85.1	0.86	9.3	0.09	75.8	0.76	10.9		
12.	6/21	3.36	35.4	1.19	4.3	0.14	31.1	1.04	11.9		
12.	6/22	1.37	82.5	1.13	6.9	0.09	75.6	1.03	8.3		



TABLE No. I—Continued.

Case No.	Date.	Total Sulphur.		Ethereal Sulphate Sulphur.		Inorganic Sulphate Sulphur.		Ethereal Sulphate Sulphur in Per Cent. of Total Sulphate Sulphur.	Diagnosis and Remarks.
		gram.	Per Cent. of Total S.	gram.	Per Cent. of Total S.	gram.	Per Cent. of Total S.		
13.	6/28	2.86	64.4	0.12	4.2	1.72	60.2	6.5	Cholelithiasis with biliary fistula. (Slow in healing.) During period 6/28 to 7/6, the urine contained bile.
13.	7/3	2.80		0.12	4.3	1.77	63.2	6.4	
13.	7/5	1.61	67.5	0.13	8.3	0.94	58.7	12.4	
13.	7/6	1.69	73.8	0.16	9.7	1.08	64.1	13.0	
13.	7/7	1.13	94.7	0.12	10.6	0.95	84.1	11.2	
13.	7/8	1.48	90.6	0.11	7.4	1.34	83.2	8.2	
13.	7/9	1.28	85.2	0.09	7.0	1.23	78.0	8.2	
13.	7/10	1.50	87.4	0.08	5.3	1.00	82.1	6.1	
13.	7/12	1.52	89.0	0.16	10.3	1.32	78.7	11.6	
13.	7/13	0.72	87.4	0.11	15.3	0.38	52.1	22.5	Urine again contained bile.
13.	7/14	2.80	67.5	0.12	4.3	1.16	63.2	6.4	
14.	8/17	0.68	87.9	0.03	4.8	0.86	83.1	5.5	Chronic appendicitis.
14.	8/22	0.86	83.0	0.03	3.8	0.68	79.2	4.6	
15.	7/15	0.49	88.4	0.04	9.8	0.38	78.6	11.1	Chronic myocarditis with broken compensation.
15.	7/25	0.48	87.5	0.03	7.1	0.38	80.4	8.1	
15.	7/27	0.37	94.6	0.09	24.3	0.36	70.3	25.7	Codeine given. Constipated.
16.	6/23	0.57	78.6	0.04	7.02	0.41	71.6	8.8	Hypopituitarism. Patient on standard Folin diet.
16.	6/26	0.41	72.5	0.03	7.3	0.27	65.2	10.0	
16.	6/27	0.80	82.4	0.06	7.5	0.60	74.9	9.1	
16.	6/28	0.90	76.7	0.04	4.4	0.65	72.3	5.8	
16.	6/29	0.87	61.7	0.05	5.7	0.48	56.0	9.4	
16.	6/30	0.96	69.2	0.04	4.2	0.63	65.0	6.0	
17.	7/26	0.38	96.3	0.02	6.3	0.29	90.0	7.5	Gastroparesis and gastric dilatation.
17.	7/27	0.76	78.9	0.06	8.9	0.53	70.0	11.3	
17.	7/28	0.79	84.8	0.05	7.5	0.81	77.3	8.8	

TABLE NO. II.—THE ETHEREAL SULPHATES OF THE URINE IN CERTAIN NEURO-MUSCULAR DISEASES.

Case No.	Date.	Total Sulphur.		Total Sulphate Sulphur.		Ethereal Sulphate Sulphur.		Inorganic Sulphate Sulphur.		Ethereal Sulphate Sulphur In Per Cent. of Total Sulphate Sulphur.	Diagnosis and Remarks.
		gram.	Per Cent. of Total Sulphur.	gram.	Per Cent. of Total Sulphur.	gram.	Per Cent. of Total Sulphur.	gram.	Per Cent. of Total Sulphur.		
18.	3/14	1.27	90.5	1.15	93.4	0.15	11.8	1.00	78.7	13.0	Myasthenia gravis, Folin diet.
18.	3/15	1.30	89.2	1.16	92.1	0.20	15.4	0.96	73.8	17.2	Myasthenia gravis, Folin diet.
18.	3/16	1.52	92.1	1.40	92.1	0.19	12.5	1.21	73.6	13.5	Myasthenia gravis, Folin diet.
18.	3/17	1.36	95.6	1.30	95.6	0.10	7.3	1.20	88.3	7.7	Sulphur intake, increased 0.6 gm.
19.	3/18	2.12	93.4	1.98	93.4	0.35	16.5	1.63	76.9	17.7	Constipated.
19.	3/19	2.08	96.1	2.00	96.1	0.18	8.6	1.82	87.5	9.0	Constipated.
19.	3/20	1.87	91.9	1.72	91.9	0.12	6.4	1.20	85.5	7.0	Constipated.
19.	3/21	1.45	89.6	1.30	89.6	0.15	10.3	1.16	79.3	11.5	Constipated.
19.	11/23	1.29	96.1	1.24	96.1	0.06	4.6	1.18	91.5	4.9	Myotonia congenita, Folin diet.
19.	11/24	1.49	93.9	1.40	93.9	0.22	14.8	1.18	79.1	15.3	Myotonia congenita, Folin diet.
19.	11/25	1.48	93.9	1.39	93.9	0.12	8.1	1.27	85.8	8.6	Sulphur intake, increased 0.2 gm.
19.	11/26	1.58	95.6	1.51	95.6	0.16	10.1	1.42	85.5	10.6	Sulphur intake, increased 0.2 gm.
19.	11/27	1.70	88.3	1.50	88.3	0.31	18.2	1.19	70.1	20.0	Constipated.
19.	11/28	1.70	91.8	1.56	91.8	0.21	12.4	1.35	79.4	13.5	Sulphur intake, increased 2 gm.
19.	11/29	1.93	94.3	1.82	94.3	0.08	4.1	1.74	90.1	4.4	Sulphur intake, increased 2 gm.
19.	11/30	1.92	93.8	1.80	93.8	0.47	24.4	1.33	69.4	26.1	Constipated.
19.	12/1	2.14	91.6	1.96	91.6	0.10	4.7	1.88	82.3	5.1	Constipated.
19.	12/2	2.00	92.5	1.85	92.5	0.23	15.3	1.12	74.6	12.4	Sulphur intake, increased 0.2 gm.
19.	12/3	1.97	93.9	1.85	93.9	0.21	12.4	1.38	80.6	11.4	Sulphur intake, increased 0.2 gm.
19.	12/4	2.15	96.3	2.07	96.3	0.10	3.4	0.99	84.6	4.8	Sulphur intake, increased 0.2 gm.
20.	4/2	1.12	93.8	1.05	93.8	0.16	14.3	0.89	79.5	15.2	Family periodic paralysis.
20.	4/3	1.29	92.3	1.19	92.3	0.11	8.5	1.08	83.8	9.2	Folin diet.
20.	4/4	1.38	92.0	1.27	92.0	0.31	22.5	0.96	69.5	24.4	Constipated.
20.	4/5	1.30	90.8	1.18	90.8	0.30	23.0	0.88	67.8	26.4	Constipated.
20.	4/6	1.24	92.8	1.15	92.8	0.12	9.7	1.03	83.1	10.4	Constipated.
20.	4/7	1.00	85.0	0.85	85.0	0.11	11.0	0.74	74.0	12.9	Constipated.
20.	4/8	1.22	90.2	1.10	90.2	0.10	8.2	1.00	82.0	9.1	Constipated.

TABLE No. III.—THE ETHEREAL SULPHATES OF THE URINE IN VARIOUS OTHER DISEASES.

Case No.	Date.	Total Sulphur.		Ethereal Sulphate Sulphur.		Inorganic Sulphate Sulphur.		Ethereal Sulphate Sulphur in Per Cent of Total Sulphate Sulphur.	Diagnosis and Remarks.
		Total Sulphur.		Ethereal Sulphate Sulphur.		Inorganic Sulphate Sulphur.			
		grm.	Per Cent. of Total S.	grm.	Per Cent. of Total S.	grm.	Per Cent. of Total S.		
21.	12/10	0.68	85.3	0.18	26.5	0.40	58.8	31.0	Congenital hemolytic jaundice with splenomegaly. Folin diet; one-half intake.
21.	12/11	0.79	88.6	0.07	8.8	0.63	79.8	10.0	
21.	12/12	0.74	86.5	0.14	18.9	0.50	67.6	21.9	
21.	12/13	0.73	83.5	0.13	17.8	0.48	65.7	21.3	
21.	12/14	0.75	86.6	0.35	46.7	0.30	39.9	53.8	Constipated.
22.	6/1	0.49	85.7	0.03	6.1	0.39	79.6	7.1	Diabetes insipidus.
22.	6/2	0.71	93.4	0.09	11.8	0.62	81.6	12.7	Diabetes insipidus.
22.	6/3	0.55	90.9	0.06	10.9	0.44	80.0	12.0	Diabetes insipidus.
22.	6/4	0.62	86.1	0.02	2.8	0.60	83.3	3.2	Diabetes insipidus.
22.	6/5	0.63	88.7	0.02	2.9	0.61	85.8	3.2	Diabetes insipidus.
22.	6/6	0.76	89.4	0.03	3.5	0.73	85.9	3.6	Diabetes insipidus.
22.	6/7	0.79	91.1	0.02	2.5	0.70	88.6	2.7	Diabetes insipidus.
22.	6/8	0.80	88.8	0.08	8.8	0.72	80.0	18.0	Diabetes insipidus.
22.	6/9	0.61	85.9	0.05	7.0	0.56	78.9	11.5	Chronic bronchial asthma.
22.	4/5	0.85	85.0	0.10	10.0	0.75	81.5	8.7	Chronic bronchial asthma.
23.	4/6	1.03	89.3	0.08	7.8	0.84	82.9	6.1	Chronic bronchial asthma.
23.	4/7	1.11	88.3	0.06	5.4	0.92	82.9	6.2	Dyspituitarism.
23.	4/8	1.00	96.0	0.06	6.0	0.92	82.9	4.6	Dyspituitarism.
24.	4/8	1.70	68.4	0.06	9.1	1.24	92.4	6.6	Dyspituitarism.
24.	4/9	1.50	88.2	0.10	13.0	1.40	92.4	15.7	Dyspituitarism.
24.	4/10	1.40	86.4	0.22	30.0	1.17	73.4	9.2	Dyspituitarism.
24.	4/11	1.37	86.7	0.12	7.4	1.18	73.3	8.7	Dyspituitarism.
24.	4/12	1.27	85.6	0.11	7.5	1.16	78.4	10.5	Dyspituitarism.
24.	4/13	1.32	77.5	0.11	8.4	0.94	71.2	16.5	Carcinoma. Treated with radium externally. Folin diet.
25.	1/13	1.33	95.5	0.21	15.8	1.06	79.7		
25.	1/14	1.35	91.1	0.19	14.0	1.04	77.1	15.4	
25.	1/15	1.32	90.9	0.18	13.6	1.02	77.3	15.0	
25.	1/16	1.36	91.1	0.19	13.8	1.05	77.3	15.3	



TABLE No. III—Continued.

Case No.	Date.	Total Sulphur.		Total Sulphate Sulphur.		Ethereal Sulphate Sulphur.		Inorganic Sulphate Sulphur.		Ethereal Sulphur in Per Cent. of Total Sulphate Sulphur.	Diagnosis and Remarks.
		gram.	Per Cent. of Total Sulphur.	gram.	Per Cent. of Total Sulphur.	gram.	Per Cent. of Total Sulphur.				
26.	3/1	0.57	87.7	0.02	3.5	0.48	84.2	4.0	Rheumatoid arthritis.		
26.	3/2	0.48	85.4	0.06	12.5	0.35	72.9	14.6	Rheumatoid arthritis.		
26.	3/3	0.80	70.0	0.05	7.5	0.51	62.6	8.9	Rheumatoid arthritis.		
26.	3/4	0.96	63.5	0.07	7.3	0.54	56.2	11.5	Rheumatoid arthritis.		
26.	3/5	0.84	70.2	0.04	4.8	0.55	65.4	6.8	Rheumatoid arthritis.		
26.	3/6	0.76	90.8	0.12	15.6	0.57	75.0	17.4	Rheumatoid arthritis.		
27.	4/4	0.67	74.6	0.04	6.0	0.46	68.6	8.0	Chronic urticaria.		
27.	4/5	0.92	73.9	0.06	6.5	0.62	67.4	8.8	Chronic urticaria.		
27.	4/6	0.80	92.5	0.16	20.0	0.58	72.5	21.7	Chronic urticaria.		
28.	4/4	0.54	92.6	0.02	3.7	0.48	88.9	4.0	Chronic constipation.		
28.	4/5	1.12	70.0	0.10	7.5	1.02	62.5	8.9	Chronic constipation.		
29.	9/27	1.98	59.1	0.07	3.9	1.09	55.2	6.6	Lobar pneumonia.		
30.	9/28	0.39	79.5	0.06	15.4	0.25	64.1	19.3	Suspected intestinal stasis.		
30.	10/1	0.63	86.4	0.04	6.9	0.50	79.5	8.1	X-ray shows no delay.		
31.	9/17	0.68	87.9	0.03	4.8	0.56	83.1	4.9	Typhoid fever, first week of disease.		
31.	9/18	0.86	83.0	0.03	3.8	0.68	79.2	3.8	Typhoid fever, first week of disease.		

Case No. 21, which after several days of constipation excreted 46.7 per cent. of the total urinary sulphur as ethereal sulphate sulphur, is of great interest. Cases Nos. 28 and 30, clinically diagnosed as auto-intoxication due to chronic constipation, showed normal excretion of ethereal sulphates and x-ray of intestinal tract showed no delay.

Case No. 27, one of chronic urticaria, is also of interest on account of the supposed idea as to its intestinal origin. In the case studied it may be noted that the ethereal sulphate of the urine is normal in amount.<sup>3</sup>

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## THE DIAGNOSIS AND TREATMENT OF SEPTICEMIA.

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By the term 'septicemia,' we mean an invasion of the blood-stream by organisms of suppuration. Originally, the term was limited to such septic conditions as follow surgical procedures, wounds, and so forth. In simple toxemia the symptoms disappear with the removal of the more or less localized infectious process. In septicemia, the symptoms continue even when it is possible to remove the localized infectious process. In reality, septicemia begins as a toxemia; the organisms gain entrance and multiply within the blood-stream; pyemia arises when synovitis, arthritis, endocarditis and single or multiple abscesses develop. The *essential* feature of septicemia is the multiplication of the organisms within the blood-current.

The attempt has been made to introduce the term 'bacteriemia,' acute or chronic; meaning a pathologic state marked by the constant presence of the poison in all parts of the body. In reality, many of our common diseases, as typhoid fever, lobar pneumonia, and so forth, are bacteriemic conditions; clinically, we do not speak of them as septicemia.

Septicemia begins as a local inflammation followed by cellulitis, lymphangitis, phlebitis, glandular enlargement and an invasion of the blood-current by the organism of suppuration. Before the invasion of the blood-current, the symptoms are those of toxemia due to absorption of the toxins. After the invasion of the blood-current, new symptoms arise; the more common of these are eruptions upon the skin, erythematous, purpuric, petechial or herpetiform in type, synovitis, arthritis, jaundice, endocarditis and abscess formation.

In the beginning, it may be impossible to distinguish between septicemia and the onset of other acute infectious diseases, or even simple localized infectious processes. Later, the occurrence of high temperature, chills, rapid pulse and respiration and the characteristic symptoms above enumerated will make the diagnosis an easy one, as a rule, especially when there is a history of a wound, operation, or localized suppurative process. The diagnosis becomes more difficult when we cannot find the point of entrance of the infectious organism; formerly we were in the habit of using the term 'cryptogenetic infection' for such a condition. A suppurating adenoid, a small internal hemorrhoid, a fissure, an



inflamed appendix, may be the original cause of septicemia. Malignancy and diabetes—in fact, many chronic diseases may terminate in septicemia. A positive blood-culture always confirms the diagnosis.

This report is based upon a detailed study of 50 cases which clinically resembled septicemia. Many other cases presenting the symptoms of septicemia were examined, but no records were made. It would be far simpler to speak of infections due to ordinary organisms of suppuration, as either 'toxemia' or 'septicemia,' meaning by the latter term that the organisms have begun to multiply within the blood-current. Pyemia is simply a complication of septicemia; at times, the metastatic foci are microscopic and are scarcely detectable clinically. Again, they lead to typical abscess formation. The term 'bacteriemia' is not descriptive of any special pathologic condition.

*Blood-Cultures.*—In 40 of the 50 cases, there is a record of the findings obtained by blood-culture. Fifty-seven per cent. were found positive; the streptococcus was the prevailing organism, although the staphylococcus was occasionally found, or a bacillus of the colon type in terminal infections. Of twenty-three patients with a positive blood-culture, 74 per cent. died and 26 per cent. recovered. Of seventeen patients with a negative blood-culture, 35 per cent. died and 65 per cent. recovered, showing that the percentage lacks only nine of being reversible. This shows the value of blood-culture in suspected septicemic cases, not only in a diagnostic, but also in a prognostic, sense. In the positive cases, we also have the means for preparing an autogenous vaccine to assist nature.

*The Blood-Count.*—The total white count varied from 7,100 to 25,000 in the patients who recovered; from 7,000 to 30,000 in those who died. In this series of cases but little real information was gained by the total white count. Ordinarily, a low total white count indicates a bad prognosis. However, a low white count may be found in patients suffering from a severe type of septicemia and still recovery may quickly follow. The differential white count, on the other hand, is of the greatest importance. When the polymorphonuclear count approaches 90 per cent., particularly when the total white count is low, the prognosis becomes grave. We look upon such a relationship of the white cells as being due to an overstimulation of the mechanism of immunity. Nature is endeavoring to overproduce the polymorphonuclear cells in order to combat the infection. In only two of the patients who recovered was the polymorphonuclear count above 85 per cent.; in both of these, owing to the long-continued infection, a severe grade of secondary anemia had developed, which in one instance was associated with a very large spleen. The lymphocyte count ordinarily is of little value, unless an acute lymphatic leukemia has developed. In one such

case, three weeks after the onset of an acute tonsillitis, the white count registered 100,000, as nearly as could be determined; at least 90 per cent. were lymphocytes of the large, small and transitional varieties. The absence of eosinophiles is supposedly a bad prognostic omen, however, this is not always true.

The study of the blood picture is important because we are enabled thereby to determine the presence or absence of severe grade of secondary anemia or of acute leukemia; at the same time the percentage of the polymorphonuclear cells gives us some idea as to the probable outcome.

*Specific Therapy.*—In most instances the antistreptococcic serums obtainable on the market had been employed before the writer was summoned; in none was a cure reported. In several instances, a marked drop in the temperature followed the use of the serum, but this was only a temporary response. In 13 of the cases autogenous vaccines were employed in addition to the regular symptomatic treatment; of this number, 7 recovered. In 8 cases, serum was used in addition to the autogenous vaccines; of this number, 4 recovered. Therefore of these 21 cases treated by means of autogenous vaccines as a routine, 11 recovered, giving a percentage of 52.

In one case of endocarditis lenta due to the streptococcus viridans, the culture was sent East to be used in the preparation of an autogenous serum. This serum was obtained and used successfully, one of the few cases of viridans infections which has been absolutely cured. This man is still living and apparently in good health, although five years have elapsed since the treatment was given. His blood-culture has been repeatedly negative.

In two instances, the autogenous vaccine was considered by the other physicians in attendance, as the deciding factor in the cure of the patient. These vaccines were used as a routine in twenty-one of the patients with the hope of stimulating the body in a specific direction. Severe reactions were avoided if possible. In the beginning, opsonic index determinations were made as a guide for succeeding infections. A definite response could frequently be demonstrated.

*Streptococcic Septicemia.*—Of 7 cases of streptococcic septicemia, in which the streptococcus was isolated by blood-culture, 5 died and 2 recovered. It seems proper to include under this heading those cases which might properly be classified as belonging to the rheumatic type; that is, presenting symptoms of erythema, arthritis, endocarditis and purpura, secondary to some local infection in the tonsil or elsewhere. Eleven such cases were seen, in 10 of which positive blood-cultures were obtained; 7 have since died and 4 are still living. In one other case of puerperal sepsis, the streptococcus was obtained by blood-culture. This patient died. Grouping these cases under the general heading of 'streptococcosis,' we have in all 19

cases, 13 of which died and 6 of which are still living. This gives us a mortality percentage of  $68 \frac{4}{10}$ ; truly, this is not very encouraging and still not as discouraging as many physicians heretofore have been led to believe.

*Puerperal Sepsis.*—An increase in the temperature following delivery may be due to many causes, but sepsis is the one cause which all obstetricians fear. Infection gains entrance into the uterus, develops in the remaining clots, penetrates the uterine wall or spreads through the lymphatics and parametric veins. In many of the lighter cases, the process remains localized to the pelvis; we can feel the thrombotic veins and some degree of pelvic cellulitis may develop. By proper treatment, the process is arrested in most cases and resolution occurs. Extension may take place, manifesting itself in local or neighboring abscess formation, or even septicemia, septico-pyemia and pyemia.

In all, twelve patients were seen who presented a septic appearance following a normal or instrumental delivery. Seven of these recovered, and five succumbed. The blood-culture was made in all, but was positive in only two, the streptococcus being obtained in one and an organism, most probably of the staphylococcus group, in the other.

Apparently the blood-culture was of little assistance in this series of cases presenting symptoms of puerperal septicemia. In only three of these twelve cases were anaerobic methods employed in the blood-culture. It seems advisable to employ both aerobic and anaerobic methods as a routine in all blood-cultures, especially when we are examining a patient suffering from puerperal sepsis. The cause of death in these cases is due to pyemia. The heart weakens as a result of the continued infection; or a pulmonary embolus may lead to a sudden death.

*Purpura Hemorrhagica.*—It was my privilege to make observations in 6 cases presenting purpuric eruptions. In one case, the streptococcus pyogenes was isolated by blood-culture; in 3 others, the culture was negative. Three of these patients died and three recovered. In two, death was caused by an acutely developing, myelogenous leukemia.

*Atypical Cases.*—Under this heading, we will include such cases as could not be conveniently and definitely classified. All were due to trivial wounds, surgical procedures or localized, septic processes. Of 12 cases, 8 died, a percentage of  $68 \frac{2}{3}$ . Of 6 cases, a positive blood-culture was obtained in three, all of which died; 2 out of the 3 with a negative blood-culture recovered; the final outcome of the third has not been determined.

*Septicemia Following Abdominal Operations.*—When the temperature is still of a septic type some time after the surgeon has operated upon a patient who has had, let us say, a perforating ap-



pendicular or typhoidal ulcer, the question arises as to the possibility of the presence of septicemia. Such symptoms may arise from infected glands and veins in the retroperitoneal spaces; again, a subphrenic abscess or empyema of the gall-bladder or thorax may have developed. When in doubt it is far better to use the aspirating syringe early than to wait until the patient has been exhausted by continued infection.

Secondary operations should not be performed, as a rule, unless the surgeon has definite indications of the existence of a pyemic abscess, and its probable anatomic relation. To open the abdomen for purposes of exploration with the hope of discovering a concealed pus cavity is more often followed by the death of the patient.

In three patients coming under this classification, the streptococcus was obtained by blood-culture in one, the patient recovering finally after the resection of a rib; a bacillus of the colon type from the blood of another shortly before death; and a negative blood-culture in another, who shortly afterwards recovered.

*Prognosis.*—In true septicemia, the prognosis depends upon the state of health of the individual, the length of time the infection has existed, the type of organism causing the infection and the complications which may develop. It is readily understood that the previous state of health of the individual is an important factor in the ultimate outcome of a septicemic infection. Pre-existing nephritis, endocarditis, arteriosclerosis, diabetes and tuberculosis diminish the patient's prospects for ultimate recovery.

The longer the course of the disease the more favorable is the prognosis. This is true of most infections and especially so in septicemia when the causative organism is the staphylococcus. As a rule, the presence of streptococci make the prognosis unfavorable. Colon bacilli are commonly found in terminal infections.

The development of an acute endocarditis diminishes the chances for ultimate recovery. Acute meningitis of the serous type is not in itself fatal, but when the meningitis is purulent in nature, then the prognosis becomes fatal. In only one instance have I seen a patient recover, whose spinal fluid contained an ordinary pus-forming organism, and in this case, the staphylococcus was grown in pure culture. Septic nephritis forms a serious complication, but it need not necessarily cause the death of the patient. In one instance, a few days after the onset of an acute septic nephritis in a patient suffering from streptococcic septicemia, secondary to a mastoid operation, the temperature dropped by crisis. The development of a localized abscess is not a serious complication provided that we are able to diagnose its position and to introduce the proper surgical procedure.

The blood-culture and the differential count assist us in deter-

mining the prognosis; a negative blood-culture and polynuclear count below 85 per cent. speak for a favorable outcome.

*Prophylaxis.*—The layman should be taught the importance of the proper care of trivial wounds. The physician should remember that localized infections should be treated by the use of simple antiseptic solutions, and that the general condition of the patient must be taken into consideration. Rest is essential. The surgeon should remember to assist nature in the healing process and to damage the tissues as little as possible.

We have no specific remedy which can prevent the invasion of the body by the organisms of suppuration. Antitetanic serum, when injected in time, prevents the development of tetanus; but it has not been shown that the use of antistreptococcic serum or stock vaccines, can prevent the onset of a septic infection.

*Treatment.*—We cannot, in so short a paper, discuss every detail of the treatment. It would be impossible to mention the names of the many remedies which have been proposed and employed. We will, therefore, confine ourselves to a discussion of the more important factors in the management and treatment of septicemia.

A capable nurse, preferably two, should be in attendance, someone particularly skillful in managing near relatives and inquisitive friends. Careful instructions, as to her duties, should be given each day. She should be instructed to cleanse the mouth carefully. It is well to allow the patient to eat ordinary peppermint or winter-green candy, although some of these patients do not care for it particularly. It serves to keep the mouth moist and fresh; it has some food value and may possess some antiseptic properties.

The patient should be treated as a consumptive whenever possible. Allow him to live in the open air; at least give him plenty of fresh air. These patients are placed in a crowded ward too often, or in a room with closed windows. This is wrong, since fresh air supplies not only the needed oxygen, but also serves to lessen the symptoms of the nervous system; it induces sleep.

*The Diet.*—Septicemia is marked by an increased metabolism in all the tissues of the body. We should attempt to meet this waste by feeding the proper number of calories. Very often, as in patients suffering from typhoid fever, the appetite is poor and no food is relished. We must encourage the patient and make the dishes as appetizing as possible. The nurse should be a good dietitian. If necessary, food may be given oftener and in smaller quantities. Add plenty of whisky to the favorite drink—our old friend, the egg-nog. Some newer forms of bottled liquid foods, as peptonoids and so forth, may be relished. Although we must feed the patient generously, it is just as important to prevent overfeeding and the consequent derangement of the digestion.

*Hydrotherapeutic Measures.*—Besides the daily cleansing bath, an alcohol sponge for high temperature should be given. The ice bath is not needed; the so-called 'fan bath' will do just as well for hyperpyrexia. The hot pack is indicated in septicemia marked by high temperature and erythema and in the absence of the more serious complications; necessarily whisky, caffeine or camphor should be given immediately before or after the pack. Allow the patients to remain in the pack ten or fifteen minutes; they usually perspire freely and thereby throw off the waste products.

When acute endocarditis has developed, an icebag may be employed over the heart. A cloth should be next to the skin and the weight of the bag lifted from the chest, if possible. As long as the icebag causes the pulse to become slower and more regular, it serves a purpose, otherwise, it might just as well be discarded.

The application of direct heat serves a very useful purpose. The patients usually tolerate dry heat better than they do the moist. The electric pad, and an apparatus constructed with electric globes as the source of the heat, can be conveniently applied to any part. They should be employed by all means to the lower abdomen in pelvic inflammation complicating pregnancy. Hot douches are well tolerated, and have great therapeutic value.

*Drug Therapy.*—Many physicians advise against the use of preparations of the digitalis series when acute endocarditis has developed. We have found this complication no counter indication to the careful use of the digitalis preparations. We may employ such preparations in the beginning to enforce the heart's action; we cannot thereby prevent the onset of acute endocarditis.

Caffeine preparations increase the heart's action and therefore the urinary output; possibly they prevent a heart paralysis.

Of the antipyretics, quinine is the most important. It should be used in small doses and often, since smaller doses increase, and larger doses paralyze, the leucocytic activity. Coal tar derivatives should be cautiously used; aspirine is the safest.

*Bactericidal Medication.*—Various preparations of silver have been employed and have been found useless, on the whole. Ungt. Credé has little more than a suggestive effect in our experience. Collargol preparations have been used intravenously but with little effect except in cases of septicemia due to the staphylococcus. Other antiseptic preparations have been used intravenously, apparently with the drawback that their dilution must be too great to secure safety in administration.

*Increased Elimination.*—We all know that it is essential to have these patients drink plenty of water to secure active elimination through the kidneys and to make up for the increased loss of water through the act of perspiration. Apparently good results have been obtained by hypodermoclysis by allowing larger amounts of



normal salt water to remain in the bowel after a cleansing enema, or by the drop method per rectum.

*Specific Medication.*—Antistreptococcic serum has little antitoxic and bacteriocidal value; it acts by so changing the bacteria that phagocytosis takes place more readily. Before deciding upon its use, we should be reasonably sure that the streptococcus is the underlying cause of the infection. If no improvement follows the use of 50 or 100 c.cm., discontinue its use or employ a serum obtained from another manufacturer. If the temperature falls to a point near normal following its use, then continue the treatment until every indication is present that the patient has definitely improved. According to the experience of most physicians, anti-streptococcic serum has only occasional real value.

Our experience has been limited to the use of autogenous vaccines. These have been employed as a routine in addition to other therapeutic measures. We have aimed to prevent general reactions. Very often no local reactions will be obtained in severe infections. Our experience has justified their continued use.

*Surgical Intervention.*—In the preceding pages we have sufficiently discussed the necessity for surgical intervention when a pyemic abscess has developed. We must rely upon the judgment of the aural surgeon when to ligate the jugular vein in order to prevent the onset of septicemia following a mastoid operation.

Spinal puncture is indicated when symptoms of meningismus or meningitis develop. In serous meningitis, the relief of pressure following the puncture acts curatively. In septic meningitis, we are enabled to make the proper diagnosis and prognosis by examining the spinal fluid obtained by the puncture.

*Management of the Convalescence.*—When improvement has begun during the course of septicemia, we must still carefully examine the patient from time to time, to determine the possibility of a new complication. By proper hygienic and therapeutic measures, we must combat an anemia or treat a heart weakened by the long-continued infection. A change of surroundings or climate is usually advisable.

## THE TREATMENT OF THE NARCOMANIAS.

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By G. H. BENTON, M. D., of Miami, Fla.

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In the thousands of articles which have appeared from time to time in the medical literature of this country, delineating the procedures in the treatment of the narcomanias, many have expressed a purely personal idea of the relative value of some specific remedy or procedure only, while they seem to be willing to recommend it in almost every kind and class of the narcomanias and insist on its specific value and merit as a specific. Thus we had some few years since foisted, not only on the medical profession, but the laity, a wonderful discovery, 'the Keeley Cure' exploited by three 'lame ducks'—a discredited clergyman, a silly drug clerk and a physician, who in their literature would impress you that this discovery was second to none in the great scientific world, and that by a few drops of a perfectly harmless solution injected under the skin, a complete mental, moral and physiological reversion would obtain, and the most loathsome drunken brute would consequently be metamorphosed into the most angelic husband and the loving father.

Years before the so-called Keeley cure was thought of, there had been vast amounts of honor work done in an able, legitimate way, absolutely without any profit or other remuneration save to their memory years after their decease, yet few were ready or even willing to listen to them or seriously consider their work because their assertions were new and out of the ordinary, and were opposed to the former teachings and the current beliefs of the times. Thus for twenty or thirty years Dr. J. Edward Turner worked to the limit of human endurance, and died in the work of striving to impress the simple truths in reference to the psychosomatic conditions which resulted in the narcomanias, but with the most limited success. Few of the medical profession listened to his argument and gave him some assistance, so that after many years of most persistent struggle and sacrifice Dr. Turner was enabled to build the first great Inebriate Hospital at Binghampton, New York, and through his great generosity and his innate love of humanity, and his unfailing faith in the integrity and honor of his fellowmen, he vested the control of this institution in a board of directors, so that he could give his individual attention to the demonstration of the facts which he had argued for so long, proving their validity. But alas, the board of directors, among whom were prominent surgeons of New York and politicians as well, was the undoing of Dr. Tur-

ner's whole life work. They voted, after trying to starve the doctor out of his own property, to sell the institution which had cost more than \$150,000, and paid for in part by private subscriptions, sale of stock, etc., to the state of New York for \$1.00. The institution has been used ever since by the state as an insane hospital, Dr. Turner dying in poverty before he could raise the money to fight the matter out in the courts and establish his and other rights of ownership to the property. Yet it only took comparatively a few months of the blatant quackery of a Keeley institute to change the attitude of the whole profession in reference to the narcomanias; and the efforts of the Keeley institute to make money and their ability to accumulate money quickly have opened up a field in which we have thousands of institutions treating the narcomaniac along similar or dissimilar lines, each feeling and many claiming superiority for their methods and means, so that the history of these institutions is similar to and quite commensurate with the history of the American medical colleges,—namely, many of which are found fully equipped and under the guidance of competent medical faculties that obtain the best from their work, and from this condition, continuing down the scale, to the absolute lack of any competent equipment or faculty, institutions doing every grade of work from fairly commendable to the most questionable.

Many years ago I became convinced of the desirability of placing every institution treating narcomania under state control, requiring at least a reasonable minimum equipment and a reasonable degree of competency and qualification of the faculty in charge, one or more of which must be a physician rendered competent by special training or personal adaptability along these lines; and that these institutions must be subject to inspection by a qualified board of control, composed of trained and efficient physicians, not politicians, who would personally visit every institution at least once or twice a year, thus keeping the standards high and insuring efficiency.

Quite the majority of the institutions in this country at this time would pass muster, while many would be forced to retire from business altogether, much to the advantage of the poor, unfortunate victims whom they fleece of their substance and often leave in a more helpless condition than that in which they were found. To extract money from their victims they are willing to assure anything which will coincide with their desires, and they further wantonly deceive them into believing that by their special mysterious drugs or methods, the ends which they desire will be speedily and miraculously accomplished; this all without fact or reason. The victim's hopes are raised beyond any degree of reason and he is led to believe that his restoration to a life of decency and respec-



tability can be accomplished entirely outside of and in spite of himself. Hence, when the awful truth dawns upon him, he finds himself again in the gutter, with every vow broken and in many cases opportunity gone,—hopeless, dejected, miserable, and fully convinced that there is now no use trying again or making any further struggle against the inevitable and toward respectability. Thus these individuals and the institutions hang millstones around the necks of their victims and add increased momentum to their downward course, signifying their willingness to gamble on a human soul for the love of the almighty dollar.

There is not within the knowledge of medical science to-day any certain specific for narcomania, and there could not be; and it seems puerile that the medical profession unthinkingly has been led even in the direction of such suspicion because of the nature of the impossibility of such facts. Narcomanias are the results of many varied causes, the specific pathology and the etiology nearly as varied as the individualities of its victim.

When the idea was advanced that narcomania was a disease and accepted as such, and again when later it became evident that in truth the narcomanias were the results concomitant with and following in the wake of inherent and acquired diseased conditions, the profession at once began to invent specifics and specific treatments with the most limited idea at first of the work to be accomplished,—beginning with the so-called bichloride of gold (which you all know does not exist) of the Keeley cure, which was guaranteed and unfortunately still is recommended with such picturesque verbiage as a guarantee to cure every mental, moral and physical ailment of the narcomaniac. This not only holds good for the Keeley institutions of to-day, but for a large number of other institutions that are much more vicious in their claims and deceptions and less fortunate in the results obtained by their treatment. This commercialism has existed to such an extent that certain features have been used as a drawing card to secure business; as, for instance, claims like the following: "Narcotica withdrawn without pain or suffering," and many others, all of which you have read time and time again. Unfortunately physicians at large and the patients' attention have been too severely centered on the means used and advocated to bridge the patient over the period of withdrawal comfortably, and to many minds the whole importance of the treatment centers on these means; while the facts are that for this period of the rational treatment there are so many excellent drugs and methods at our command to be selected to suit each individual case, based upon the conditions present, that it becomes really of much minor importance as compared with the necessity of the most technical after-treatment. This after-treatment must

not only restore the patient to his former condition of physical vigor and moral rectitude, but in the majority of patients we must go beyond this point and make of the patient a far better man than he formerly was, thus reinforcing him against the possibility of relapse. The matter of the personal equation is the most important single factor in the treatment of the narcomaniac.

The physical factors then employed as a means of sustaining the patient during the withdrawal period are so varied and adequate that we can choose from many methods and sources that which seems most practical and adaptable to the case in hand. Elimination is then the keynote next in order, rapid and complete elimination, especially complete, which means that all the emunctatory channels shall be stimulated to their fullest function and kept working at full time, this guided of course by all knowledge of detail and full understanding of the status *præsens* of the patient. We must know how to meet any possible emergency which may arise at any moment, relegating the idea of stereotyped treatments, which have been and are being so thoroughly advertised, to the category of the Patent Medicine Industries. Stereotyped treatments for the narcomanias immediately suggest inefficiency, carelessness, commercialism, sometimes one, many times all three with other added objections. Experience has proved conclusively that there are scarcely any other diseased conditions which demand a greater range or even so great a range of therapy, as does the treatment of narcomanias.

In the treatment of the narcomaniac we have the physical, the mental, the moral and the sociological conditions all needing adjustment to a greater or lesser degree in practically every case; all important factors and all individual factors varying as does the individuality of different individuals, and such factors as cannot be met in the different cases with exactly the same means and measures, hence legislating against stereotyped procedures. Such treatment and management of each case must be selected as seems applicable to the case, and adjusted, or changed entirely, or varied until results are obtained. Consequently it is improvident to accept a patient for treatment with definite promise, assuring him of certain accomplished results within a certain definite time.

Narcomanias are expressions of an extrinsic autotoxiosis and usually superimposed upon intrinsic autotoxic states, and many times in a patient who is further physiologically encumbered by hereditary and acquired defective conditions or degenerations. Hence the folly of those advertised so-called cures, which propose and even offer to guarantee, with their special mysterious remedy and measures, to make within a certain specified time a patient normal who was never otherwise than normal even before his addiction.

Nevertheless, the following facts obtain and they are being demonstrated in many reputable institutions under the careful care of competent, trained men. That the narcomania may be relieved, some or all of the physical deficiencies corrected, the mental attitude changed, the sociological surroundings altered or adjusted, and the patient be taught to condone such other conditions as cannot be obliterated to such a degree that the symptoms lose their identity and the patient becomes the competent master of his own situation.

The last word, however, has not been spoken on the subject of treatment, management and provision for the narcomaniac, and especially so with the morphiomaniac, whose symptomatology differs somewhat from the other narcomaniac and within whose symptomatology we find frequently that the ever impressive psychomoral aspect tends to obscure the recognition of the really important study of the clinical symptoms in their absolute relation to the physiological conditions, which is the basis upon which rational treatment should be applied and which is always individual.

Our knowledge of the total harm accruing from the continuous use of morphia is still fragmentary and incomplete. Most of us believe that the excessive use of morphia produces a picture of extrinsic autotoxycosis, expressing functional perversions rather than organic changes, yet in many instances superimposed upon previously established or hereditary organic lesions which may further add to or vary the clinical picture, hence each case represents an individual entity, and we at present possess little means of accurate determination of the exact relation of one to the other, or of each or both to the symptomatology of the case in hand.

Certain physical facts and clinical data are at hand, however, that may establish certain rules of guidance, which observed will assure a working formula within the range of acceptability. It is well known that the vast majority of morphiomaniacs habitually use much more drug than is of physiological necessity; hence, one-third or one-half of the quantity they are using when they present themselves for treatment can be deducted with much benefit. Again it is well known that the picture presented by these patients is one of a retention toxemia with the predominance of evidence pointing to retention within the liver; therefore we get immediate and satisfactory results from the use of cholagogue cathartics, such as aloes, calomel, colocynth, jalap, rhubarb, podophyllum, or sodium phosphate, either used alone or in combination with one or another of these drugs; and further, as elimination is the keynote in the value of the earlier treatment, catharsis should be established early, frequently administered, and kept continuously active. Concomitant with this elimination all the other emunctory channels should



be opened and kept stimulated to their fullest capacity and also continuously: hydro- and phototherapy as well as balneology meet the requirements better I think than any other means. As has been pointed out previously in this paper, the therapeutic range, valuable and applicable, in the treatment of this class of patients, covers practically selected means from every branch of medical or physical therapeutics. This necessarily embodies a more or less technical knowledge of all these branches in order to have sufficiently good judgment in their application and use so as to insure the best results, and to know further when one is getting the results desired and from just which means applied in any specific case are the most rapid and desirable results obtained.

Physicians with competent experience and training in the treatment of the narcomania invariably begin the consideration of any patient with a careful study of the personal equation, physiologically, psycho-morally, and sociologically. He requires careful explanation on the part of the patient and his friends, if possible, for the cause of, excuse for, and length of time of addiction. He then seeks to establish the amount of the drug used of a single kind or of combinations, with the manner of use of each; and then he obtains all the knowledge he is able to obtain of the reaction and personal resistance of the patient, taking careful account, if possible, if the patient in hand shows a resistance above, below or commensurate with a relatively average normal standard.

The experience of the trained physician has taught him that the morphiomaniacs, who apply for relief of their addiction, are using an excess or are unable to get the requisite supply, hence in either case are suffering considerable inconvenience if nothing more; and he also knows that among all those patients who submit themselves for treatment, only those who are neurotics experience those dreamy, pleasurable, fascinating, sensuous results obtained from the drug which are an expression of its minor toxic action and which first binds the neurotic in complete subjection.

Thus it is well known by ample demonstration that many addicts require and take only such an amount of morphia as is necessary to meet the physiological (though morbid) requirements, and that by virtue of their careful hygienic regime, of daily elimination, food supply, work, rest and recreation, they are capable of going on for long periods of time without detection; for morphia symptomatology therapeutically administered experimentally to animals or humans bears little relation or resemblance to the symptomatology observed in the individual who has established narcotic tolerance. Organic dependence upon morphia appears to supply functions, maintain an equilibrium in the nervous balance and legislates against collapse, and for such a patient a definite amount of mor-

phia supplies as definite a requirement of his integral daily needs as does food, air and water. While an insufficient amount or an over-supply of the drug almost immediately furnishes evidence leading to detection and impending danger, once the elimination becomes incomplete, larger amounts of the drug become locked up in the body, depressing secretions, limiting organic functioning, followed by the common symptomatology of physical deterioration covered by the autotoxemia, causing malnutrition and generally psychosomatic deterioration erroneously believed to be due to the direct action of morphia.

The physiologic formula which obtains in the morphine addict, allowing him to consume lethal doses of the drug without succumbing entirely, as would one unaccustomed to its daily use, is not yet established to our complete assurance. Whether or not there are formed within the physical economy antibodies or antitoxic endogens, or whether there is an advanced morphine oxidizing propaganda, has not yet to my knowledge been fully proved. We know that nature abhors poison, but seeks to live in spite of it; hence these defensive attitudes through which Nature is able to establish a relative immunity. But by virtue of the inability to maintain the exact balance of intake and elimination, the physiological balance suffers. Therefore concomitant with the elimination at the onset of treatment certain supportive drugs are indicated of which the belladonna group seems to be the most favorable choice, administration of which benumbs the acuteness of the sensory nerve centers, rendering the patient less sensitive to the physical metamorphosis which is taking place within his economy.

The subject of withdrawal of the narcotic is still a bone of contention among many men, even among those with considerable experience. Some are committed to sudden, absolute withdrawal and affirm that it is the only reasonable way to deal with patients; others insist that their procedure is the only humane treatment,—that is the gradual withdrawal, reducing the habitual dose of the patient very gradually so that he experiences little discomfort through the process. One I think has a right both to confirm and condemn both processes, especially as a routine measure neither is rationally applicable to all cases. In the robust, hearty patient showing little or no psychosomatic inferiority, I should select the sudden and complete withdrawal method. This is rather heroic treatment, perhaps; and when the time of almost complete elimination occurs and the patient shows those distressing symptoms, as he will express it "of the bottom dropping out," I would give him large doses of sparteine sulphate hypodermically,—3 or 4 gr., at least, every two, four or six hours to keep him as comfortable as possible.

In a patient expressing a mild degree of psychosomatic inferior-

ity or, in other words, one who represents quite the average morphiomaniac who applies for treatment, I think I should choose the complete withdrawal of the morphia with the substitution of say dionin, giving the dionin in doses from three to twenty times as great if necessary, as the patient was using of morphia. Here the dionin seems not to have the same accumulative results as does morphia, hence the advantage because the patient does not suffer from the withdrawal.

Personally, I should not choose the very gradual withdrawal method ever, excepting as it was necessary to meet an emergency in a patient of most decided psychosomatic inferiority, presenting organic or other functional lesions which would admit of no other methods. It is tedious, discouraging, and uncomplimentary both to the physician and the patient. The more rapid the metamorphosis can be reasonably produced, the better is the psychic condition of the patient, and the more ready he is to help to assist you in assisting himself. The fear of suffering in the morphiomaniac is quite as derogatory as the fact of suffering, if the real suffering is not too intense. Thus with this very gradual reduction the patient has continually before him the possibility which he regards as a probability of the advent of those awful minutes, hours and days of discomfort and torture with the next reduction. This keeps him continually disturbed and apprehensive, and entirely unready for co-operation or personal effort toward his own betterment.

Now, concomitant with the beginning of the treatment, I have found much advantage I think in putting the patient upon a good general tonic containing some of the bitters as well as something to reinforce digestion. Of the bitters one thinks of gentian, calumba, nux vomica, berberis, quassia, etc.; of the digestants, pepsin, pancreatin, malt, diastase, etc. The general combination which I have found very serviceable, however, is composed of large doses of solid ext. quassia, ammonium chloride, with elixir lactopeptine as a menstruum, administered every two hours during the day.

The choice of a tonic, of course, as the choice of any other drug or therapeutic procedure selected, should be made after sufficient study of the conditions present, so as to warrant a selection capable of meeting the demands rather than following blindly stereotyped measures which are so common and unwarranted.

When elimination and withdrawal are complete and the patient is able to pull himself together somewhat, he is ready for the most vitally important part of the program. Then the psychomoral and sociological aspects must be taken up and analyzed in detail, education and re-education must apply, and nothing else can take its place. To say to a patient at this period, "Thou art now well, go and sin no more," would be as irrational as to say to him when he



applied for treatment that "There is nothing wrong with you, just stop taking dope and you will be all right." This is where training, experience and a personal ability to understand and interpret mental aspects and conditions are constantly demanded and must be continually applied with deftness and skill and unfailing persistence, the detailing of which, however, is beyond the scope and space of a paper of this kind. It would require volumes of textbook matter to cover the field acceptably to the uninitiated, hence the necessity of training and experience, competent equipment, which mean much. An institution with every available therapeutic appliance and some one with the technical knowledge of practical application and judgment to decide the better of two or more courses of treatment in certain definite cases and the ability to know just when and how results are being obtained, and an institution with room and facilities of indoor and outdoor life, work, recreation, diversion by play or employment, rational control for varying periods both legal and moral of patients who require guardianship or censorship, attempts to supply all the permanent deficiencies. To curtail and obliterate the detrimental superfluities of moral and sociological attitudes of your patients is a program of no small moment, and nothing less than an honest attempt to accomplish these ends is commensurate with our code of medical ethics.

This then involves great expenditure of money and preparation and effort to prepare oneself for the proper handling of this class of cases; and I realize full well the wave of opposition which will come from the unprepared on account of my suggestions and my advocating these seemingly higher standards; yet all physicians will, if honest, admit of their practicability and desirability and also that good though they be they are insufficient for the cure of some patients who come to them for relief. In advocating these standards I do not in any way intend to decry the excellent results obtained by many, perhaps by all the institutions and persons who are treating these cases even with little or no equipment, or training or preparation. In many instances their results are really accidents accruing from business ventures purely vicious; in others it is the noble effort of the unprepared physician to execute his duty in meeting an emergency thrust upon him. Small means may secure excellent results in selected cases, but our ability to select just the case to fit the limited preparation and equipment may be inadequate; and further, the lure of the dollar is so subtle that we are apt to accept nearly every patient whom we are offered, and hence make an obligation which we are unable to discharge. In each instance these facts are matters of serious moment to the patient whom no one offers to or can reimburse.

In evidence of simple effective means, I well remember a chronic

alcoholic, working as a car cleaner in the Erie R. R. yards at Buffalo, New York, many years ago. One afternoon the foreman, who found himself short of help for the immediate work required, discovered that this workman was rapidly becoming so intoxicated as to be useless in a short time; so he telephoned for the railroad surgeon who promptly administered  $\frac{1}{10}$  gr. apomorphia, hypodermically, leaving his patient in a semiconscious condition on the ground between two rows of freight cars, with no further care or attention from anyone, and to live or die as his personal equation might make it possible. He lived and still lives, and although he has since been bartender in the lowest bar-rooms in Buffalo for a period of at least fifteen years, he has never touched alcohol in any form. This might be the thousandth or the hundred thousandth or the millionth exception; and while possible in some cases, it is in no way probable in many, and thereby in no way excuses lack of equipment and training in those who seek to treat this most important class of cases legitimately.

Since the operation of the Harrison law, the procuring of the necessary amount of the narcotic drug by the habitué is almost if not completely impossible. Many adverse conditions have arisen and have been nobly met by physicians as emergencies with surprisingly favorable results, without competent equipment or valuable experience, and contrasted also by many failures. It has also induced many unprepared men to enter the field, attempting to fill a vacancy of which they little realize the necessities.

These facts, therefore, should not mitigate against every medical man, every politician, every desirable citizen eternally clamoring for the state and the municipality to furnish fully-equipped, competent institutions for the care and control of this large army of unfortunates.

## SPECIAL ARTICLE.

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### 'LITTLE CLASSICS' PHYSICIANS MAY HAVE OVERLOOKED.

["One grows sick of the expressions 'poor Charles Lamb,' 'gentle Charles Lamb,' as if he were one of those grown-up children of the Leigh Hunt type, who are perpetually begging and borrowing through the round of every man's acquaintance. Charles Lamb earned his own living, paid his own way, was the helper, not the helped; a man who was beholden to no one, who always came with gifts in his hand, a shrewd man, capable of advice, strong in counsel. Poor Lamb, indeed! Poor Coleridge, robbed of his will; poor Wordsworth, robbed of his own *ego*; poor Southey, writing his tomes and deeming himself a classic; poor Carlyle, with his nine volumes of memoirs....call these men poor, if you feel it decent to do so, but not Lamb, who was rich in all that makes life valuable or memory sweet. But he used to get drunk. This explains all. Be untruthful, unfaithful, unkind; darken the lives of all who have to live under your shadow, rob youth of joy, take peace from age, live unsought for, die unmourned—and remaining sober you will escape the curse of men's pity, and be spoken of as a worthy person." Thus Augustine Birrell in his "Obita Dicta" (Second Series). And what he says is true not only of Charles Lamb but of lesser men.

In the case of Charles Lamb, the trenchant, biting words of Augustine Birrell have an applicability that fits the character of England's most delightful essayist as a glove should fit a hand. Charles Lamb was neither 'poor' nor 'gentle' but a self-respecting, self-supporting, humane being, whose manliness never deteriorated into bombast and bluster but assumed that aspect of gentleness that offends those whose interpretation of manliness is founded on the proper use of the bludgeon and pistol. When the clear sky of Mary Lamb's intellect was dark with clouds and she killed her mother in 1796, it was Charles Lamb who became her guardian, and with patience and forbearance and courage born of grim determination led her back to those paths of life that he knew would alleviate the sufferings of his unfortunate sister. Those paths can be found only in the homes of literary men; and that he succeeded in his kind ministrations was amply proved by the joint volume of brother and sister published in 1807—"Tales from Shakespeare." So again we say with Augustine Birrell, "Poor Lamb, indeed!"

We take it that to-day the name of Charles Lamb is quite unknown to the medical men who, when off medical duty and in search of so-called literary pastimes, are wont to read the popular magazines of the day. And because we feel that they ought to know the "Essays of Elia" better than we imagine they do, and because we would impress them with the philosophy and grace of diction of Charles Lamb's writings, we are printing the subjoined essay. But we are also printing it because though this man of genius "used to get drunk," he was not ashamed to confess his weakness in writing, not because he wanted to justify his act,—he was not of a sniveling nature wanting sympathy or a braggart defiant of public opinion,—but because his nature was of that fine fibre that is not fearful of the light of day exposing too cruelly its defects and shortcomings. This is bravery, indeed, and illustrates that in the quiet walks of life bravery is at times as exalted as it is on the battle-field.—LITERARY EDITOR.]



## CONFESSIONS OF A DRUNKARD.\*

Dehortations from the use of strong liquors have been the favorite topic of sober declaimers in all ages, and have been received with abundance of applause by water-drinking critics. But with the patient himself, the man that is to be cured, unfortunately their sound has seldom prevailed. Yet the evil is acknowledged, the remedy simple. Abstain. No force can oblige a man to raise the glass to his head against his will. 'Tis as easy as not to steal, not to tell lies.

Alas! the hand to pilfer and the tongue to bear false witness have no constitutional tendency. These are actions indifferent to them. At the first instance of the reformed will they can be brought off without a murmur. The itching finger is but a finger in speech, and the tongue of the liar can with the same natural delight give forth useful truths with which it has been accustomed to scatter their pernicious contraries. But when a man has commenced sot——

O pause, thou sturdy moralist, thou person of stout nerves and a strong head, whose liver is happily untouched, and ere thy gorge riseth at the *name* which I have written, first learn what the *thing* is; how much of compassion, how much of human allowance, thou mayest virtuously mingle with thy disapprobation. Trample not on the ruins of a man. Exact not, under so terrible a penalty as infamy, a resuscitation from a state of death almost as real as that from which Lazarus rose not but by a miracle.

Begin a reformation, and custom will make it easy. But what if the beginning be dreadful, the first steps not like climbing a mountain but going through fire? What if the whole system must undergo a change violent as that which we conceive of the mutation of form in some insects? What if a process comparable to flaying alive be to be gone through? Is the weakness that sinks under such struggles to be confounded with the pertinacity which clings to other vices, which have induced no constitutional necessity, no engagement of the whole victim, body and soul?

I have known one in that state, when he has tried to abstain but for one evening—though the poisonous potion had long ceased to bring back its first enchantments, though he was sure it would rather deepen his gloom than brighten it—in the violence of the struggle, and the necessity he has felt of getting rid of the present sensation at any rate, I have known him to scream out, to cry aloud, for the anguish and pain of the strife within him.

Why should I hesitate to declare that the man of whom I speak is myself? I have no puling apology to make to mankind. I see them all in one way or another deviating from the pure reason.

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\*From "Poems and Essays" by Charles Lamb. Frederick Warne and Co., London.

It is to my own nature alone I am accountable for the woe that I have brought upon it.

I believe that there are constitutions, robust heads and iron insides, whom scarce any excesses can hurt; whom brandy (I have seen them drink it like wine), at all events, whom wine, taken in ever so plentiful a measure, can do no worse injury to than just to muddle their faculties, perhaps never very pellucid. On them this discourse is wasted. They would but laugh at a weak brother, who, trying his strength with them, and coming off foiled from the contest, would fain persuade them that such agonistic exercises are dangerous. It is to a very different description of persons I speak. It is to the weak, the nervous; to those who feel the want of some artificial aid to raise their spirits in society to what is no more than the ordinary pitch of all around them without it. This is the secret of our drinking. Such must fly the convivial board in the first instance, if they do not mean to sell themselves for term of life.

Twelve years ago I had completed my six-and-twentieth year. I had lived from the period of leaving school to that time pretty much in solitude. My companions were chiefly books, or at most one or two living ones of my own book-loving and sober stamp. I rose early, went to bed betimes, and the faculties which God had given me, I have reason to think, did not rust in me unused.

About that time I fell in with some companions of a different order. They were men of boisterous spirits, sitters up a-nights, disputants, drunken, yet seemed to have something noble about them. We dealt about the wit, or what passes for it after midnight, jovially. Of the quality called *fancy* I certainly possessed a larger share than my companions. Encouraged by their applause, I set up for a professed joker!—I, who of all men am least fitted for such an occupation, having, in addition to the greatest difficulty which I experience at all times of finding words to express my meaning, a natural nervous impediment in my speech!

Reader, if you are gifted with nerves like mine, aspire to any character but that of a wit. When you find a tickling relish upon your tongue disposing you to that sort of conversation, especially if you find a preternatural flow of ideas setting in upon you at the sight of a bottle and fresh glasses, avoid giving way to it as you would fly your greatest destruction. If you cannot crush the power of fancy, or that within you which you mistake for such, divert it, give it some other play. Write an essay, pen a character or description—but not as I do now, with tears trickling down your cheeks.

To be an object of compassion to friends, of derision to foes; to be suspected by strangers, stared at by fools; to be esteemed dull when you cannot be witty, to be applauded for witty when you

know you have been dull; to be called upon for the extemporaneous exercise of that faculty which no premeditation can give; to be spurred on to efforts which end in contempt; to be set on to provoke mirth which procures the procurer hatred; to give pleasure and be paid with squinting malice; to swallow draughts of life-destroying wine which are to be distilled into airy breath to tickle vain auditors; to mortgage miserable morrows for nights of madness; to waste whole seas of time upon those who pay it back in little inconsiderable drops of grudging applause, are the wages of buffoonery and death.

Time, which has a sure stroke at dissolving all connections which have no solider fastening than this liquid cement, more kind to me than my own taste or penetration, at length opened my eyes to the supposed qualities of my first friends. No trace of them is left but in the vices which they introduced and the habits they infixed. In them my friends survive still, and exercise ample retribution for any supposed infidelity that I may have been guilty of towards them.

My next more immediate companions were and are persons of such intrinsic and felt worth, that though accidentally their acquaintance has proved pernicious to me, I do not know that, if the thing were to do over again, I should have the courage to eschew the mischief at the price of forfeiting the benefit. I came to them reeking from the steams of my late overheated notions of companionship, and the slightest fuel which they unconsciously afforded was sufficient to feed my old fires into a propensity.

They were no drinkers, but, one from professional habits, and another from a custom derived from his father, smoked tobacco. The devil could not have devised a more subtle trap to retake a backsliding penitent. The transition from gulping down draughts of liquid fire to puffing out innocuous blasts of dry smoke was so like cheating him. But he is too hard for us when we hope to commute. He beats us at barter, and when we think to set off a new failing against an old infirmity, 'tis odds but he puts the trick upon us of two for one. That (comparatively) white devil of tobacco brought with him in the end seven worse than himself.

It were impertinent to carry the reader through all the processes by which, from smoking at first with malt liquor, I took my degrees through thin wines, through stronger wine and water, through small punch, to those juggling compositions which, under the name of mixed liquors, slur a great deal of brandy or other poison under less and less water continually, until they come next to none, and so to none at all. But it is hateful to disclose the secrets of my Tartarus.

I should repel my readers, from a mere incapacity of believing me, were I to tell them what tobacco has been to me, the drudging



service which I have paid, the slavery which I have vowed to it. How, when I have resolved to quit it, a feeling as of ingratitude has started up; how it has put on personal claims and made the demands of a friend upon me. How the reading of it casually in a book, as where Adams takes his whiff in the chimney-corner of some inn in "Joseph Andrews," or Piscator in the "Complete Angler" breaks his fast upon a morning pipe in that delicate room *Piscatoribus sacrum*, has in a moment broken down the resistance of weeks. How a pipe was ever in my midnight path before me, till the vision forced me to realize it; how then its ascending vapours curled, its fragrance lulled, and the thousand delicious ministrings conversant about it, employing every faculty, extracted the sense of pain. How from illuminating it came to darken, from a quick solace it turned to a negative relief, thence to a restlessness and dissatisfaction, thence to a positive misery. How, even now, when the whole secret stands confessed in all its dreadful truth before me, I feel myself linked to it beyond the power of revocation. Bone of my bone——

Persons not accustomed to examine the motives of their actions, to reckon up the countless nails that rivet the chains of habit, or perhaps being bound by none so obdurate as those I have confessed to, may recoil from this as from an overcharged picture. But what short of such a bondage is it which, in spite of protesting friends, a weeping wife, and a reprobating world, chains down many a poor fellow, of no original indisposition to goodness, to his pipe and his pot?

I have seen a print after Correggio, in which three female figures are ministering to a man who sits fast bound at the root of a tree. Sensuality is soothing him, Evil Habit is nailing him to a branch, and Repugnance at the same instant of time is applying a snake to his side. In his face is feeble delight, the recollection of past rather than perception of present pleasures, languid enjoyment of evil with utter imbecility to good, a Sybaritic effeminacy, a submission to bondage, the springs of the will gone down like a broken clock, the sin and the suffering co-instantaneous, or the latter forerunning the former, remorse preceding action—all this represented in one point of time. When I saw this, I admired the wonderful skill of the painter. But when I went away, I wept, because I thought of my own condition.

Of *that* there is no hope that it should ever change. The waters have gone over me. But out of the black depths, could I be heard, I would cry out to all those who have but set a foot in the perilous flood. Could the youth, to whom the flavour of his first wine is delicious as the opening scenes of life or the entering upon some newly discovered paradise, look into my desolation, and be made to understand what a dreary thing it is when a man shall feel

himself going down a precipice with open eyes and a passive will,—to see his destruction and have no power to stop it, and yet to feel it all the way emanating from himself; to perceive all goodness emptied out of him, and yet not to be able to forget a time when it was otherwise; to bear about the piteous spectacle of his own self-ruins:—could he see my fevered eye, feverish with last night's drinking, and feverishly looking for this night's repetition of the folly; could he feel the body of the death out of which I cry hourly with feebler and feebler outcry to be delivered,—it were enough to make him dash the sparkling beverage to the earth in all the pride of its mantling temptation; to make him clasp his teeth,

and not undo 'em

To suffer wet damnation to run through 'em.

Yea, but (methinks I hear somebody object) if sobriety be that fine thing you would have us to understand, if the comforts of a cool brain are to be preferred to that state of heated excitement which you describe and deplore, what hinders in your instance that you do not return to those habits from which you would induce others never to swerve? if the blessing be worth preserving, is it not worth recovering?

*Recovering!*—O if a wish could transport me back to those days of youth, when a draught from the next clear spring could slake any heats which summer suns and youthfu' exercise had power to stir up in the blood, how gladly would I return to thee, pure element, the drink of children, and of childlike holy hermit! In my dreams I can sometimes fancy thy cool refreshment purling over my burning tongue. But my waking stomach rejects it. That which refreshes innocence only makes me sick and faint.

But is there no middle way betwixt total abstinence and the excess which kills you?—For your sake, reader, and that you may never attain to my experience, with pain I must utter the dreadful truth, that there is none—none that I can find. In my stage of habit (I speak not of habits less confirmed—for some of them I believe the advice to be most prudential), in the stage which I have reached, to stop short of that measure which is sufficient to draw on torpor and sleep, the benumbing apoplectic sleep of the drunkard, is to have taken none at all. The pain of the self-denial is all one. And what that is I had rather the reader should believe on my credit than know from his own trial. He will come to know it whenever he shall arrive in that state in which, paradoxical as it may appear, *reason shall only visit him through intoxication*; for it is a fearful truth that the intellectual faculties by repeated acts of intemperance may be driven from their orderly sphere of action, their clear daylight ministries, until they shall be brought at last to depend for the faint manifestation of their departing

energies upon the returning periods of the fatal madness to which they owe their devastation. The drinking man is never less himself than during his sober intervals. Evil is so far his good.\*

Behold me, then, in the robust period of life, reduced to imbecility and decay. Hear me count my gains, and the profits which I have derived from the midnight cup.

Twelve years ago I was possessed of a healthy frame of mind and body. I was never strong, but I think my constitution (for a weak one) was as happily exempt from the tendency to any malady as it was possible to be. I scarce knew what it was to ail anything. Now, except when I am losing myself in a sea of drink, I am never free from those uneasy sensations in head and stomach which are so much worse to bear than any definite pains or aches.

At that time I was seldom in bed after six in the morning, summer and winter. I awoke refreshed, and seldom without some merry thoughts in my head, or some piece of a song to welcome the new-born day. Now the first feeling which besets me, after stretching out the hours of recumbence to their last possible extent, is a forecast of the wearisome day that lies before me, with a secret wish that I could have lain on still, or never awaked.

Life itself, my waking life, has much of the confusion, the trouble, and obscure perplexity of an ill dream. In the daytime I stumble upon dark mountains.

Business, which, though never very particularly adapted to my nature, yet, as something of necessity to be gone through, and therefore best undertaken with cheerfulness, I used to enter upon with some degree of alacrity, now wearies, affrights, perplexes me. I fancy all sorts of discouragements, and am ready to give up an occupation which gives me bread from a harassing conceit of incapacity. The slightest commission given me by a friend, or any small duty which I have to perform for myself, as giving orders to a tradesman, etc., haunts me as a labour impossible to be got through. So much the springs of action are broken.

The same cowardice attends me in all my intercourse with mankind. I dare not promise that a friend's honour or his cause would be safe in my keeping, if I were put to the expense of any manly resolution in defending it. So much the springs of moral action are deadened within me.

My favorite occupations in times past now cease to entertain. I can do nothing readily. Application for ever so short a time kills me. This poor abstract of my condition was penned at long in-

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\*When poor M—— painted his last picture, with a pencil in one trembling hand, and a glass of brandy and water in the other, his fingers owed the comparative steadiness with which they were enabled to go through their task in an imperfect manner to a temporary firmness derived from a repetition of practices the general effect of which had shaken both them and him so terribly.



tervals, with scarcely any attempt at connection of thought, which is now difficult to me.

The noble passages which formerly delighted me in history or poetic fiction now only draw a few weak tears, allied to dotage. My broken and dispirited nature seems to sink before anything great and admirable.

I perpetually catch myself in tears for any cause or none. It is inexpressible how much this infirmity adds to a sense of shame and a general feeling of deterioration.

These are some of the instances concerning which I can say with truth that it was not always so with me.

Shall I lift up the veil of my weakness any further? or is this disclosure sufficient?

I am a poor nameless egotist, who have no vanity to consult by confessions. I know not whether I shall be laughed at or heard seriously. Such as they are, I commend them to the reader's attention if he find his own case any way touched. I have told him what I am come to. Let him stop in time.

# MEDICAL AND SURGICAL PROGRESS.

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## CUTANEOUS CONDITIONS ASSOCIATED WITH DISEASES OF THE GLANDS OF INTERNAL SECRETION AND WITH VAGOTONIA.

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A REVIEW OF RECENT LITERATURE.

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By H. H. HAZEN, M. D., of Washington, D. C.

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1. Foerster: The Relation of Internal Secretions to Cutaneous Diseases. (*Jour. Cutaneous Diseases*, 1916, Vol. XXXIV, p. 1.)
2. McEwen: The Relation of Internal Secretions to Cutaneous Diseases. (*Jour. Cutaneous Diseases*, 1916, Vol. XXXIV, p. 15.)
3. Eppinger and Hess: Vagotonia. Nervous and Mental Disease Publishing Co., New York, 1915.

In hyperthyroidism the most striking single cutaneous phenomenon is undoubtedly the excessive sweating of the palms. In addition, plantar and axillary sweating is often profuse. The skin is usually thinned, subject to congestion and at times shows characteristics like those of a child. Pigmentary changes are frequent, and disorders of the nails may be noted. Urticaria and pruritus are not uncommon. Diffuse scleroderma, alopecia, vitiligo and erythema have been reported.

In hypothyroidism or myxedema the skin is pallid, cold and wrinkled, usually coarse, and there may be fat pads in the supraclavicular fossæ. There may be patches of erythema upon the nose or cheeks. The hair is thin, dry and lustreless, and nail changes are not infrequent. Some observers have held that various other diseases are associated with this syndrome—namely, ichthyosis and adiposis dolorosa or Dercum's disease. However, there is no good proof of this. Scleroderma and atrophy of the skin have also been blamed on the same cause.

As is well known, removal of the parathyroid glands causes chronic tetany, and it is possible that a lessened amount of secretion from them will cause an analogous condition. In individuals affected with tetany the hair growth frequently ceases, and the nails and teeth undergo dystrophic changes, and anomalies of pigmentation may appear.

So far as is at present known changes in the thymus gland have no effect upon the skin.

In Addison's disease, where there is a diminished secretion from the adrenals, there is marked increase in the pigment.

In hyperpituitarism the hair follicles are increased in size, the papillæ are hypertrophied, the sebaceous glands are enlarged and very active, and acne is common; the connective-tissue in the subcutis is increased so that the skin has a boggy feel, and hypertrichosis may also be present.

In hypopituitarism, the skin is smooth and velvety, almost infantile in character, the axillary and pubic hair is usually dimin-

ished, and in men the latter has a feminine distribution. The scalp hair may be thinned; pigmentation often appears. The writer of this review has recently seen 3 cases of this condition, all of the patients being affected with greasy skin and acne. It should also be noted that lipomatosis may be due to this condition, a fact not sufficiently emphasized by the authors quoted.

In diabetes, due to a failure of the internal secretion from the pancreas, it is well known that skin infections are common; in addition, the deposit of sugar about the genitalia may cause local irritant troubles.

Removal of the testicles in the male infant favors the persistence of infantile characteristics; hair growth is scanty and fat accumulates in the subcutaneous tissues; the hair growth is deranged. In the female the cessation of secretions from the ovary produces hypertrichosis and often wrinkling of the skin due to a loss of the subcutaneous fat.

Inasmuch as the symptom complex of vagotonia is not well known to the majority of physicians, it is first necessary to say a word or two about it. It is customary to speak of all nerves which arise from the sympathetic cord as 'sympathetic,' while all other vegetative nerves of the nervous system are spoken of as 'autonomic' (the system of the extended vagus). The vegetative nerves are those fibres which go to all organs having smooth muscles, such as the intestines, blood-vessels, gland ducts and skin, and also to the heart, the beginning and ending of the alimentary tract, and the muscles of the genital apparatus.

Sufferers from vagotonia are usually classed as neurasthenics, for their symptoms are distinctly nervous in type, due to excessive stimuli transmitted through these fibres. Inasmuch as the endocrine glands are supplied through these same fibres, the symptom complex may resemble disorders due to ductless gland disease. As a rule, patients afflicted with vagotonia show hasty and precipitous actions, their faces flush readily, while their hands may show cyanosis; they perspire readily; the palpebral slits are usually wide, and the eyes may show some of the signs supposed to be characteristic of exophthalmic goitre. Frequently they are undernourished, although this is by no means always the case. The heart is apt to be very irritable, and nervous indigestion is the rule. Asthmatic attacks are by no means infrequent. Either spastic constipation or mucous colitis may be found.

In some instances the following cutaneous abnormalities may justly be blamed upon vagotonia: increased sweating, cold hands and feet, cyanosis of the extremities, marked dermatographism, the dilator type of which may go on to a true exudative dermatitis, and pigmentary changes. Eppinger and Hess assert that the sweating skin will never show either dermatographism or true wheals, a statement that is certainly not always true. Either fugitive or more permanent erythemas and edemas are undoubtedly due to this symptom complex: during the winter I have watched a number of cases. It is still questionable whether or not some cases of urticaria are due to this condition; I feel that an occasional chronic case may be. Unfortunately the authors have but little to say about treatment. Reede and I feel that focal infections are frequently responsible for one of our most marked cases clearing up after the removal of badly infected tonsils.



## VAGINITIS IN CHILDHOOD.\*

## A REVIEW OF RECENT LITERATURE.

By ALFRED FRIEDLANDER, M. D., of the Editorial Staff.

The wide prevalence of vaginitis in childhood—the rapidity of its spread, the difficulty of its control, make it a much dreaded disease.

The report above referred to has been drawn as the result of a great deal of careful work, investigation and study, and it would seem therefore that the conclusions reached should have as wide publicity as possible.

Seven sets of questionnaires, designated to cover the subject from different standpoints, were sent out to (1) Health Officers (cities and states); (2) Physicians; (3) Pathologists and Bacteriologists; (4) Hospitals; (5) Children's Homes, Training Schools and Asylums; (6) Gynecologists; (7) Social Service Departments in Hospitals and Visiting Nurse Societies.

In compiling resumés of the replies, it was deemed advisable to consider not only the individual answers but also the general impression conveyed by the collective answers.

The important points which the questionnaire was intended to disclose were (1) whether there is an intelligent appreciation on the part of health officers as to the nature of the disease, and an interest in attempting to deal with it effectively; (2) whether or not there has been any investigation as to the prevalence of the disease in children's institutions, hospitals and schools; (3) whether or not any laws, ordinances or rulings have been passed by state and municipal authorities looking toward the control of contagion with possible suggestions to this end. It is worth noting at once that of 86 replies from health officers, 44 stated definitely that there was neither interest in nor appreciation of the problem, nor was there any investigation or attempted control. Only 9 of the 86 had instituted any investigation as to the prevalence of the disease, while 28 of the 86 had made some attempt to control its spread.

The disease is not a reportable one in many cities. The policy of permitting institutions and hospitals to make their own rules governing admission and care of vaginitis cases seems to be in general favor. Opinion is about equally divided as to the advisability of having school nurses make untrue examinations of the children for the presence or absence of vaginitis.

Thirteen city and state officials had encountered so few cases as to make the problem of official control of relatively little importance to them.

\*Fife, Gittings and Carpenter: Report of the Committee of the American Pediatric Society on Vaginitis in Childhood. (*Trans. Am. Ped. Soc.*, 1915, p. 331.)

So far as suggestions from health officers, looking to the control of the disease is concerned, the answers varied from frank admissions of lack of preparation to absolute pessimism as to possible results.

Many officers hold that education of the profession and public must precede public health measures

In general, isolation and careful routine treatment, with follow-up work after cure in the homes, were recommended.

Of the physicians answering the questionnaire about half believe that vaginitis in childhood is caused by the gonococcus in 90 per cent. of the cases, particularly in hospital practice.

In general, the opinion seems to be held that the disease is on the increase, both in private and hospital practice.

Seventy-six per cent. of the physicians believe it to be a serious disease either to the child itself or because of the danger of transmission. Thirty-nine per cent. have seen serious complications, *e. g.*, pus tubes, pelvic peritonitis, arthritis, endocarditis, ophthalmia, etc.

A majority of the physicians are in favor of making gonococcus vaginitis a reportable disease.

Summed up, it would seem that physicians and health officers find that gonococcus vaginitis is a true Neisserian infection in most cases; that it should be reportable; that the infection outside hospitals results from carelessness and ignorance, with immorality playing an insignificant rôle; that, with regard to contagiousness in hospital practice, the disease ranks with the exanthemata; that cure is obtained with great difficulty; that owing to the tendency of the disease to become latent and simulate cure, the possibility of spread of infection is great; that thorough hospital treatment of the patient, with instruction of the laity, offers the best hope for limiting the spread of the infection.

So far as the questionnaire to the bacteriologists is concerned, it may be said that at least half the answers received indicated that for diagnosis smear preparations would suffice. That with predominating intracellular Gram negative, biscuit-shaped diplococci in a discharge from a situation susceptible of infection with the gonococcus, the diagnosis is justified. Cultural tests were insisted upon by about one-third of the observers. The same proportion seemed to think the complement fixation test necessary.

With reference to the value of vaccine treatment, the opinion of the bacteriologists varies greatly. Autogenous vaccines are preferred to stock vaccines.

The details of the questionnaire submitted to hospitals and children's institutions do not lend themselves well to condensed statement here.

The resolutions submitted by the Committee to the Society after its labors, cover the ground fully and are herewith appended.

I.—That the American Pediatric Society address a special letter to health officers containing the following points:—

1. That cities be compelled to make adequate hospital provision for the care of cases of vaginitis.

2. That children with vaginitis be excluded from school.

3. That a matron be placed in charge of the girls' toilet room in public schools.

4. That U-shaped toilet seats be used in all schools.

5. That city and state laboratories be equipped to make bacteriological examinations for private physicians.

6. That educational literature on the subject of vaginitis be prepared and distributed.

7. That gonococcus infection be made a reportable disease.

II.—We recommend that the American Pediatric Society address a special letter to hospitals containing the following points:—

1. That all hospitals which care for children be urged to admit cases of vaginitis for proper treatment with due protection for the other patients, preferably in separate wards.

2. That microscopic examination of smears be made before admission to wards.

3. That observation wards be provided.

4. That individual utensils (such as syringes) and toilet articles (such as soap, powder and lubricant) be provided.

5. That single service diapers be used (at least for girls).

6. That repeated examinations of all girl patients for the presence of vaginitis be made during their stay in the hospital.

7. That low toilets be provided.

8. That tub baths be not used for the routine bathing of girls, but instead spray bathing.

9. That the principles of aseptic nursing be most thoroughly taught and enforced.

10. That special facilities for the dispensary treatment of gonococcus vaginitis be provided and that adequate instructions be given to mothers.

11. That nursing care and supervision be given in the home.



## CORRESPONDENCE.

Editor, INTERSTATE MEDICAL JOURNAL,

In an article by Dr. I. Seth Hirsch of New York City, on the "Roentgen Ray Study of the Esophagus," appearing in the INTERSTATE MEDICAL JOURNAL, Vol. XXIII, No. 4, April, 1916, such disparaging statements were made in reference to the 'Hog Casing Method' of examination of the esophagus that I feel it necessary to appear in its defence. It is quite evident from the remarks made in the paragraph on "Contrast Methods" that the author has never used the 'Hog Casing Technique' and therefore is not competent justly to compare this method with his own. This is particularly brought out in the following dogmatic statement which he makes: "The disadvantages and limitations of these methods, however, are so evident as to make it unnecessary to dwell upon them at length." In addition he states that "aside from the discomfort to the patient and the difficulty of the examination because of the restlessness and gagging, the procedure is not without a certain danger, in the presence of aneurysm or dilated aorta or diseased heart." Under competent hands, this method can be used with a minimum amount of disturbance. It is necessary, however, for the operator to have sufficient confidence in himself, not to be afraid to prepare the patient properly, which means the administration of 15 gr. of chlorotone one hour before, and repeated fifteen minutes before the examination. Spraying the fauces with a 2 per cent. solution of cocaine is also part of the preparation. An inexperienced operator might hesitate to use this on account of a possible idiosyncrasy, or he might feel nervous about dipping his casing into an emulsion of Irish moss called 'lubrichondrin.' It is unnecessary to state that the casing method should never be used until a preliminary examination has been made, excluding aneurysm, dilated aorta or dangerous cardiac lesions.

In answer to the statement that "these methods give no information regarding the nature of the stenosis and do not permit a diagnosis of early lesions," I wish to state that the beautiful part of the 'Hog Casing Method' is its ability to bring out not only the condition of the esophagus above the stricture, the extent and character of the channel through the obstruction, but also the condition of the walls below. I have never seen any over-distention of the esophagus with this method; and while it is possible that the inflated casing might interfere with the normal physiological action, we must remember that we are as a rule dealing with a pathological condition, that the amount of dilatation of the esophagus above the stricture is information that the surgeon especially desires, as it clearly indicates the limitation of the involvement of the walls. In my article on "Advanced Roentgen Technique in the Diagnosis of Esophageal Lesions," published in the October, 1914, issue of the *American Journal of Roentgenology*, I explained at length that the 'Hog Casing Method' was particularly valuable in very early cases which had not produced sufficient obstruction to stay the bismuth paste, that by this technique I could obtain a more accurate reproduction of the esophagus in early involvement than by any other method. In making this statement, I include Dr. Hirsch's method which I have tried many times. That there is value in his bismuth and acacia mixture there can be no doubt, but it must be given in sufficient quantities to be retained in the obstructed area and fill the dilated tube above. The use of it in small quantities, as recommended, with the idea of coating the walls of a collapsible tube like the esophagus and obtaining sufficient detail on which to base an important diagnosis, is very unreliable.

In a recent controversy with Dr. L. G. Cole of New York City, published in the *American Journal of Roentgenology*, Vol. III, No. 3, March 16th, Dr. Hirsch states: "The fanatical adherence to one particular method to the exclusion of every other valuable contribution to a subject, is a mental attitude that is, to say the least, unscientific." Applying this paragraph to his remarks on the 'Hog Casing Method,' I can only say "them's my sentiments."

Yours faithfully,

W. H. STEWART.

222 West Seventy-ninth Street, New York.

## BOOK REVIEWS.

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MÉDICAL JURISPRUDENCE. A Statement of the Law of Forensic Medicine. By Elmer D. Brothers, B. S., LL.B., Member of the Chicago Bar, etc. etc. St. Louis: C. V. Mosby Co. 1914. Price, \$3.00.

This treatise on "Medical Jurisprudence" by Brothers attempts to place before the medical student and practitioner the chief facts of jurisprudence as they pertain to the practice of medicine. The book is based upon lectures given by the writer for the last twenty years to medical students. This can be considered a fairly satisfactory book on this subject. It does not commend itself to the reviewer as showing any particular advance either in method or arrangement over a number of others on the same subject which have appeared in recent years.

The chief objection to this book lies in its arrangement and its somewhat confusing style. There are many definitions which must be read several times before the meaning is clear. This is chiefly due to a careless use of English and to confusion of terms. For example: a definition of insanity in law is a negative definition, when a positive statement of what constitutes an insane individual would be much more to the point. There is likewise a remarkable looseness of terms used both in the definition itself and in the illustration. To illustrate, the author quotes the following: "A person who cannot distinguish between red and green is mentally disordered, but it is not insanity, he is merely color blind." The obviousness and uselessness of such a statement are clear and serve no purpose that the reviewer can possibly see. These are only mentioned as illustrative of the above criticism. Many more might be quoted. The chapter on expert testimony is not particularly illuminating or is the chapter on evidence clear. It is difficult for the reviewer to see just why this book has been written and published, or just what advantage it would be to the practitioner of medicine. After all, what a physician wants in a book of this kind is a clear statement of fact as to his relation to the law and such guidance as may be necessary for his proper conduct when he is presented with problems which are a part of legal procedure. He is less concerned with definitions and the clumsy phraseology of legal literature than he is with a statement of facts and a clear description of what is meant in law by terms which to him appear rather confusing. Of special importance is it for a physician to know something about evidence, something about what is permissible and what is not in the nature of testimony in regard to medical questions.

A legal authority who would venture to write about these things in some such way would be conferring a lasting benefit upon the medical profession. As far as the reviewer can see this book does not begin to fulfil this want.

**SKIN CANCER.** By Henry H. Hazen, A. B., M. D., Professor of Dermatology in the Medical Department of Georgetown University, Professor of Dermatology in the Medical Department of Howard University, etc. etc. With Ninety-Seven Text Illustrations, and One Colored Frontispiece. St. Louis: C. V. Mosby Company. 1916.

While this book was primarily intended for the use of the medical student and the general medical man, the specialist in diseases of the skin will find it a valuable and helpful aid in his daily work, for in a comparatively small space the author has managed to crystallize an amount of knowledge that would do honor to a much larger and more elaborate treatise.

The manner of presentation often is original, and will serve to impress upon the mind of the novice and the beginner important points which might easily be overlooked, or buried in a mass of irrelevant material in one of the larger books.

While but few of the rarer dermatoses are discussed in detail, the commoner affections are exhaustively described. The chapters on eczema and syphilis are particularly valuable, and the one dealing with cancer of the skin exhibits the loving touches of a master hand.

The histopathology of the various disorders is dealt with in a manner that serves to clarify the subject, rather than mystify the mind of the average reader.

In the matter of treatment, the author has confined himself to a description of those means and methods which he knows from personal experience are productive of results, and by so doing has won both our admiration and our gratitude. In seeking advice when one is combating some troublesome and resistant cutaneous disorder, nothing is more disconcerting than to find a writer describing about forty-seven different methods of treatment, none of which he specifically recommends or is willing to sponsor. Hazen always faces this responsibility frankly—at times even joyously—and in a manner that is as convincing as it is edifying.

Some of the illustrations are lacking in detail, and in future editions we would suggest that many of the photomicrographs be replaced by drawings. Aside from these little shortcomings, the book is an excellent piece of work, and one which reflects credit on American dermatology.

**NERVOUS CHILDREN.** Prevention and Management. By Beverley R. Tucker, M. D., Professor of Neurology and Psychiatry, Medical College of Virginia, Richmond, Va., etc. etc. Boston: Richard G. Badger. 1916. Price, \$1.25.

This is one of those short treatises on the subject of nervous children which serves to illustrate chiefly how difficult the art of writing on a technical subject for teachers, parents, and others interested in children is.

The intent of the writer of this little book is commendable. There is no doubt that there is a demand and a great need for an intelligent discussion of the subject. Unfortunately the author has not succeeded, chiefly because he has tried to make things seem easy which are not easy, and because he has asserted things were so which are not so.



On the front page of this book is a picture of a child, evidently the subject of spastic paraplegia of the right arm and leg. The legend of this photo reads: "An early operation would have prevented this paralysis." The author surely does not mean to imply anything of this sort. An early operation, if it had been successful, and if there had been no other cause for spastic paralysis than birth hemorrhage, and if the hemorrhage had not extended, and if destruction of cerebral tissue had not followed, then the child might have been saved. This is given as an illustration of much of the spirit running through this book.

There is a good deal to be said of attempts of the sort Tucker has made. It is hoped that some day a book of this nature might be written which contains no half-truths, a book which is a straightforward account of a difficult and complicated subject, written plainly, in which the difficulties of the subject itself are not glossed over, but made as clear as it is possible to do, and in which differences of opinion, if they exist, are put down as a difference of opinion and not glossed over by exaggeration and emphasis of one side or the other, as the author is inclined to believe.

That this book of Tucker's does not reach such a standard must be admitted, and for that reason it seems to the reviewer that it serves no important purpose from the standpoint of the lay reader and certainly not from the standpoint of the instructed reader.

**MENTALLY DEFICIENT CHILDREN—THEIR TREATMENT AND TRAINING.** By G. E. Shuttleworth, B. A., M. D., etc., Fellow of King's College, London, etc. etc., and W. A. Potts, M. A., M. D., etc., Medical Officer to the Birmingham Committee for the Care of the Mentally Defective, etc. etc. Fourth Edition. Philadelphia: P. Blakiston's Son & Co. 1916.

This is the fourth edition of the well-known book on "Mentally Deficient Children." In the preface to this book the author mentions the fact that a French version has already been published and permission for a Japanese translation has been requested. This indicates how wide a reception has been given to this little book. The first chapter is an historical review of the subject, and is of considerable value because in a very brief space is given a good running account of the development of knowledge and interest in the defective child. Chapter II consists largely of a discussion of the various acts brought up before the English Parliament for the education and commitment of defective children. The last of these—the so-called Mental Deficiency Act—came into operation in England and Wales in 1914. The important thing about this chapter is that a brief résumé is given of these acts of parliament, and form at least a basis upon which future legislature in this country might be suggested.

The clinical and pathological portions of this book are about the same as are met with in most treatises of this kind. There is the same attempt at clinical differentiation based upon anatomical considerations and the same discussion of etiology, diagnosis, etc.

What makes this book particularly valuable is that a good deal of attention is given to methods of training, recreation, industrial activities, etc., and the results and conclusions from all of these various therapeutic agencies are set down with a good deal of conservatism and with a good deal of weighing of evidence.

This book is recommended as easily the best short book in the English language on the subject of mentally deficient children.

**DISEASES OF THE SKIN.** By Richard L. Sutton, M. D., Professor of Diseases of the Skin, University of Kansas School of Medicine, etc. etc. With Six Hundred and Ninety-three Illustrations, and Eight Colored Plates. St. Louis: C. V. Mosby Company, 1916.

A large book upon diseases of the skin by an American author must naturally face comparison with the older books of Stelwagon and Pusey, and with the newer book by Ormsby. The most striking innovation about Dr. Sutton's book is the wealth of illustrations, especially histopathological ones. He has nearly one hundred of these, and practically all of the common conditions are portrayed. In addition there is a very complete series of clinical illustrations, better than in any of the other books. But the illustrations are not the only things to be commended: the text is concise, clear, remarkably free from typographical errors, and while in no way radical, still an excellent portrayal of the author's strong individuality. For instance, he strongly favors intramuscular injections of salvarsan. Not a known dermatological disorder is slighted; in this respect the book is the most complete that we have. The bibliography is also excellent, rivaling Stelwagon in this respect. There is an excellent chapter upon the diagnosis of skin diseases, and the one upon general treatment is thoroughly up to date. It is to be regretted that the use of a few measured doses of the  $x$ -ray is not more strongly endorsed. The chapter upon cancer is scientific, for it carefully discriminates between basal and prickle-celled neoplasms. To sum up, the book is well balanced, extremely well illustrated, and is absolutely essential to the library of every man who treats diseases of the skin. It bears comparison with the other standard dermatologies without a tremor.

**REFRACTION OF THE HUMAN EYE AND METHODS OF ESTIMATING THE REFRACTION.** Including a Section on the Fitting of Spectacles and Eye-Glasses, etc. By James Thorington, A. M., M. D., Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine, etc. etc. Three Hundred and Forty-Four Illustrations, Twenty-Seven of Which are Colored. Philadelphia: P. Blakiston's Son and Co. 1916. Price, \$2.50.

The present book is the outcome of a constant and increasing demand for a single volume work embodying the subject matter of the author's well-known works, "Refraction and How to Refract," "Prisms," and "Retinoscopy."

The work is in reality an amalgamation of the above-named books. Necessarily there have been deletions and modifications in the interest of brevity, but nothing of importance contained in the three books has been omitted.

Those who have had the pleasure of possessing and perusing the author's former publications will welcome this addition. Dr. Thorington has the happy faculty of saying much in a short space and of saying it in readable English. The selection of topics for discussion, as well as the exclusion of matter which at the present time



possesses merely historical interest, betokens the nice appreciation of the author for the needs of the student of this subject.

**A TEXTBOOK FOR MIDWIVES.** By John S. Fairbairn, M. A., B. M., B. Ch. (Oxon.), F. R. C. P. (Lond.), F. R. C. S. (Eng.), Obstetric Physician, With Charge of Out-Patients and in Charge of a Maternity Ward, St. Thomas's Hospital, etc. etc. With 3 Plates and 104 Illustrations, 5 in Colour. New York: Oxford University Press. 1914. Price, \$3.75.

Undeniably this is a splendid work, well fitted for the purpose for which it is designed. This very fact, however, forcibly suggests the question: How many training schools for midwives in this country have a curriculum, or the student material to permit the adoption of a volume like this as their standard textbook? For our training schools for hospital nurses the work probably will prove too complex; thus we can only hope that this book will find its way into the hands of all those responsible for or interested in the problem of adequate training of midwives. This textbook furnishes convincing evidence of the striking difference existing in the training of the continental and American midwife. We trust it will help to stimulate present efforts to develop a better type of midwife in this country, or eliminate her entirely from obstetrical practice.

**THE TREATMENT OF ACUTE INFECTIOUS DISEASES.** By Frank Sherman Meara, M. D., Ph. D., Professor of Therapeutics in the Cornell University Medical College in New York City, etc. etc. New York: The Macmillan Company. 1916. Price \$3.50.

This book deals with the treatment of disease in its practical aspect. It is indeed gratifying to find a work on therapy which states not only the various indications, but which likewise gives explicit directions for carrying them to completion. One need only cite as an example the author's detailed description of the Brand bath to make clear the plan of the entire book. Directions as to diet are set forth in the same way. The kind of food to be taken, the exact amounts, its caloric value, and the manner of its preparation, are given in such manner as to leave no room for doubt or speculation. A book written in this manner fills a large gap in our medical literature. The author does not pretend to set forth every recommended method of treatment. On the contrary he quotes in great part from his own experience and practice. It is to be hoped that the present volume on the treatment of infectious diseases is the precursor of volumes dealing with the other medical diseases.

**CHANGES IN THE FOOD SUPPLY AND THEIR RELATION TO NUTRITION.** By Lafayette B. Mendel, Professor of Physiological Chemistry in the Sheffield Scientific School of Yale University. New Haven: Yale University Press. 1916. Price, \$0.50.

In this little essay the author calls attention to a condition which has been pointed out before, at least as it affects other phases of human existence—namely, that our scientific and technical advance in the problem of nutrition has far outdistanced our ability to give practical expression to this increased knowledge. It is in short a plea for the socialization of the science of nutrition, using the term in its broadest sense.



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## EDITORIAL.

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### THE SECRET OF A SUCCESSFUL MEDICAL CAREER.

No doubt you have cogitated time and again upon the fact that you are not as successful as you ought to be, that despite the care you take of your person and grammar, your advance towards the haven of peace and content, where the gentle breezes drop dollars into your lap, is a painful performance characterized by short and halting steps. You may by turns have been scientific or frivolous in the sick-room, or you may have been patient or impatient of the prolix and tiresome stories, poured into your ears by well-meaning men and women who imagine that because of your interest in medicine you had the same interest in the ineptitudes of daily life. And yet despite your desire to please, you have found at the end of each month no increase in your funds to justify a note of self-congratulation; and you may have sought solace from confiding your troubles to a fellow practitioner, who perturbed you to a greater degree by telling you that his method was the only one to pursue! But let us pause here, and assure you in your dire straits, that what you have done in the past to solve the problem of why you are a partial failure has been a sheer waste of time, for if you will read the illuminating lines which grace Katherine O'Shea's (Mrs. Charles Stewart Parnell) "Charles Stewart Parnell: His Love Story and Political Life," we feel that not only will you change your sick-room manner, but that the longed-for success will shadow your very footsteps. To quote: "As soon as we moved to the new house an old friend, and noted steeplechase rider, came to stay with us for a few days with his wife. He became very ill at dinner, and in a few hours was raving in delirium tremens, while his poor wife hid sobbing in my bedroom, as she was so much afraid of his violence. He was a big man, and our doctor a little one, but after the

first encounter, when the doctor was knocked down flat on entering the room, the doctor was absolutely master of the situation. I have always had the greatest admiration for the medical profession."

What could be easier than for you to enter a room obsequiously, keep silent with bowed head, possess your soul in patience, and await with an inward joy the moment when "a big man" would "knock you down flat." This may seem to you that we are advocating the rôle of a coward, and that we are depriving you of your great and glorious manhood, with its record of many guerdons won in hand-to-hand engagements. But since it is a fact that all your endeavors, hitherto, to gain the meed of success that you really desire, have proved fruitless and that you have been in a quandary as to why your gentle or your ferocious ways in the sick-room have been unyielding in the matter of popularity and money, and since it is a fact that the bravest doctor is a bit timorous the first time he visits a patient lest the impression he makes will be the wrong one,—would it be altogether demeaning to your worth as an ornament to the profession if you would allow yourself to be "knocked down flat" by a big or, for that matter, by a little man? The bruises would heal in a few days; but what are the bruises and the kink necessarily put into your physical prowess in importance compared with what happens afterwards, for does not Mrs. Parnell tell us that "after the first encounter, when the doctor was knocked down flat on entering the room, the doctor was absolutely master of the situation"? Thus by bowing the head in great humility and graciously taking the blows you become "master of the situation," and at least win a high encomium from Mrs. Parnell, since her after-thought is that because of this occurrence she has always had "the greatest admiration for the medical profession."

From the above we readily see how wrong our reasoning has been as to the best way to become popular and rich. We have walked in darkness, to be sure, and have flattered ourselves that by being cocksure, conceited and proud, or, on the other hand, gracious, amiable and somewhat hypocritical, we could achieve our ends. But though we have allowed our large and small conceits to guide our footsteps in the sick-room in the past, or our docility and extreme diffidence, the future looks roseate, for at last the means are at hand that shall lead us to the Promised Land, where such compensation and appreciation will be ours that the struggling and unappreciated doctor will be as extinct as the Ichthyosaurus.

P. S.

## BOOKS AND AUTHORS.

In a recent article in the *Fortnightly Review* (London) by Arthur Waugh on "The New Realism," there are illuminating lines on its trend and what has been achieved by it in England. In summing up the attitude of the young men of the hour who are writing, Mr. Waugh quotes what Ibsen's character, Stensgård, says: "We are young. The time belongs to us, but we also belong to the time. Our right is our duty." And the reader of Mr. Hugh Walpole's "The Dark Forest" (George H. Doran Company, New York) will agree both with Mr. Waugh and also with Ibsen that the recent masters of English realism belong to the present time and can picture it in such wise that it is brought before the reader in all its physical and spiritual dimensions and with a rhetoric that makes use of no superfluous words. A room is described as it really is: its harsh lines as well as its graceful lines; a field is a stretch of ground, ill-kempt or otherwise, but no mythological metaphors are poured into the reader's ears: the graceful birds flying over it do not soften the stubble; a road that has been tramped upon by many people is not a broad highway with the light of Heaven upon it and the glory of Nature on either side, as was the habit of the older writers, but a street cut with ruts and covered with dust. The hero does not walk jauntily along this sort of thoroughfare, drinking in the glorious air and thanking his good fortune that he has been given the opportunity to drink in fresh air and also to walk miles: he thinks of his sore feet; he sees a task before him that his tired muscles must accomplish; he is loath to hate his fate that makes him a weary wanderer, and yet he cannot but compare his state with him who lives in luxury. This is the note of 'the new realism,' and be it true or false, we must accept it as characteristic of the times as the times are seen and judged by the writers. Now Mr. Walpole uses exactly these methods in his novel, and the result is that we have a document, intense and powerful, that drives home truths which, though they have always been with us, have been overlooked by the older writers, since they were either thought to be not worth while recording, or of such lowly quality that they would mar too greatly the romance of life. In "The Dark Forest," the scene of which is laid in Russia during the present war, we have Englishmen, and Russians of both sexes, and small matters and some very large ones. The Great War is the background, but the military incidents are not the sort we have hitherto found in the novels which have been written about the present collapse of civilization; they are not inflated with romance or with any great degree of patriotism. Rather do we see dogged duty, the persistence that comes to all men when once they undertake a 'job,' the *j'y suis, j'y reste* (I am there, I remain there) manner of looking at circumstance, the horror of it all, the meanness of it all, and yet the ineluctable sense of duty that is part of true manhood. The characters of Trenchard, the clumsy Englishman who is misunderstood by his Russian companions, and Sister Marie Ivanovna are portrayed in stiff and but few rounded lines; and though the author wastes no words, the psychology of the Englishman is brought to light and the psychology of the Russian nurse. And all the Russians, be they physicians or laymen, are analyzed with a degree of detail and yet with a paucity



of words that makes each one the human, such as we really know persons to be. Yes, there are dust and grime in this story: dust on the streets and in the rooms and grime as spots on the characters; and there are some cowardice and some bravery; and there are some sense of honor and the great tragedy of a misunderstanding. But the reader who wants high-flown rhetoric, who wants romance, should turn away from this book the greatest yet written about the present war.

P. S.

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If the reader will recall the methods pursued in all Greek tragedies:—how in the very beginning the chorus announces the fate of this or that person, the destruction of some town, the overthrow of some army—and the simplicity and beauty of the lines of the plays, he will be in the right frame of mind to appreciate every word of Edward Morlae's "*A Soldier of the Legion*" (Houghton Mifflin Company, Boston and New York). Here we have a writer untrained, we take it, but with an eye for all the essentials in the proper telling of a story, who perhaps unwittingly is imbued with the Greek ideals as to how to write a tragedy, but who scores in the same manner as did Sophocles and Euripides and Æschylus by the beauty of phrase, the directness of thought, and the dirge-like note that permeates his whole narrative. In the very beginning the reader is able to visualize the motif of the story, for the author tells him at once that, "One day during the latter part of August, 1915, my regiment, the 2me Etranger (Foreign Legion), passed in review before the President of the French Republic and the commander-in-chief of her armies, General Joffre. On that day, after twelve months of fighting, the regiment was presented by President Poincaré with a battle-flag. The occasion marked the admission of the Légion Etrangère to equal footing with the regiments of the line. Two months later—it was October 28—the remnants of this regiment were paraded through the streets of Paris, and, with all military honors, this same battle-flag was taken across the Seine to the Hôtel des Invalides. There it was decorated with the cross of the Legion of Honor, and, with reverent ceremony, was placed between the flag of the cuirassiers who died at Reichshofen and the equally famous standard which the Garibaldians bore in 1870-71. The flag lives on. The regiment has ceased to exist." Succinct and to the point is such writing; tragical with the face of tragedy unmarred by tears, but with the deep and grim lines of inevitable and inexorable fate.

The Foreign Legion is made up of all sorts of men: men who forced by circumstances or from a matter of preference have basked in crime. These lying, cheating, unmoral remnants of humanity are given a haven by France, and in return when war breaks out there are no men in the French army who are braver, who are more audacious, who are less fearful of consequences. Of these elements was composed the Second Regiment over which Morlae was Sergeant; and though there were some respectable Americans in the number—respectable by comparison with the others—the rank and file was from the dregs of society, as the phrase goes on the lips of the Philistines. But what matter that the soldier of the Foreign Legion had robbed and killed; what matter that he had absconded with his master's money; what matter that he had wan-

dered over the face of the earth to avoid arrest and had escaped by joining the Foreign Legion; when the first trumpet sounded in the present Great War he shouldered his musket and said: *Adsum*. And Sergeant Morlae's story of the pitiful disaster that overtook his regiment bears out what we have just said, and also bears out the impression all of us have always had in regard to the Foreign Legion:—that no matter where sent in time of war, no soldiers can equal them for bravery and self-sacrifice.

The tale unfolded by the author is one to read again and again, not to oneself always, but now and then aloud to a choice company of friends grown into the sort of manhood that can put aside the frivolities of life and take note of its deepest tragedy. For no tragedy is greater than the daredevilry of an outcast, who hunted by the law and scorned of men, is yet imbued with the finest expression of patriotism at a time when his country really needs him, and who thinks naught of danger so long as he can pay back to that country just one iota of gratitude for the peace and content that were his for a few years. And France is the only country that has a Foreign Legion.

P. S.

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If you have not read Masefield's "The Everlasting Mercy," "The Widow in the Bye Street," or "The Story of a Round-house" we would advise you to do so at once, for by reading these books you will be brought into juxtaposition with the greatest poetical mind in England to-day. You may be prejudiced against poetry, having received your first impressions of this sort of literary expression from the third-rate poems in the corners of country or metropolitan newspapers, or it may be that when you were a youngster your teacher kept you too long poring over "The Raven" by Edgar Allan Poe or some poem by Longfellow. Masefield's poetry is of an altogether different calibre from the poems we imagine you have fed your mind upon; and while we are not in a position to say that your mind has been altogether neglectful of the world's poetical masterpieces, we *are* in a position to assure you that the English poet's narratives—the three we have mentioned—will reveal to you something so new, so startling, so comprehensive of modernity that you will agree with us that here we have a master whose voice is of supreme quality. But Masefield is not only a poet of the first rank, but also a novelist of worth and a dramatist whose plays should give us pause. His "Tragedy of Nan," already reviewed in these columns, is of a quality that few dramatists attain to-day, and the play which has recently reached us, "The Faithful" (The Macmillan Company, New York) has all the virility, the sombreness, the demand for justice against injustice which characterize all his works.

You have no doubt read many versions of how the present European war started: how a great Power demanded an apology from a second-rate Power; and not getting it in the form demanded, rushed into war. And no doubt you thought the great Power was right, just as you think the superman ought to have everything he desires. Of course, you were forgetful of the fact that the small citizen has to live; that the small state has to exist. You were blinded by the greatness of the Power that demanded an abject apology from a little nation, and you lustily allied yourself to strength. Now Masefield does not do this thing in his tragedy, for



he knows, perhaps better than you, that the ruler over a small state has certain rights which, though insignificant by comparison with the rights of a great Power, are nevertheless of supreme importance to the ruler and to the state. This is the moral of his powerful play "The Faithful"; and although the scene is laid in Japan in the early part of the eighteenth century, its applicability to present circumstances cannot be denied. In prose which is marked by short sentences the tale of intrigue, of overweening ambition, of the lust for power, is unfolded, and from the first page until the last the reader is held in "the fierce clutch of Circumstance." But what would all this intriguing be if described by one not of the genius of Masefield? A sorry tale, indeed, to be thrust aside after a superficial perusal; surely not the great lesson wrought in English such as only Masefield yields from his precious ore.

P. S.

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The majority of Americans have had a surfeit of the European war and are already prophesying what is going to take place after the war ends. This prophetic spirit was rampant with all thinking (?) Americans during the first months of the war in regard to its early termination; and although we may well laugh now at what was said during those early months by the wiseacres, we should not be too severe on a weakness of human nature that is continually with us and makes much of knowing what is going to happen in the near future, or many years hence. Has not every household a prophet, a firm believer in knowing what is going to happen to some adventurous spirit who is not afraid to venture out in a driving rain without an umbrella, or who, on other occasions, is unthinking enough to imperil his health by some infraction of those Spartan laws laid down by the stern advocates of preventive medicine? But if we deride somewhat the prophet of small calibre and grow restive under his advice, as to how we are to conduct ourselves so that health and happiness shall be our meed, and if we are a bit tired of hearing from the man in the street what he thinks is going to happen in Europe when the war terminates, or from the newspaper correspondent, or the many essayists whose 'stuff' is hurriedly and somewhat sensationally written so as to entrap the public, an altogether different attitude should be assumed by every intelligent reader towards the few books of moment on this very vital subject; and no book that has recently come to our desk has better ideas more clearly stated than has Mr. H. G. Wells's "What Is Coming?" (The Macmillan Company, New York). Mr. Wells holds a pen that for virility is unequalled to-day; and even though as a prophet in foreshadowing what is going to occur in Europe at the close of the war, the future may show him to be made of very poor stuff, the ideas he presents to the public to-day have the engaging and truthful qualities which can come only from a thinker whose probity cannot be questioned. Of course, Mr. Wells, being an Englishman, is going to arrange matters to suit his English ideas; but be it said here they are very good ideas and of a practicality that is admirable. This is especially shown in "The Outlook for the Germans" and in "Europe and Socialism," two papers that contain all those admirable qualities—virility, acumen, audacity—which have made Mr. Wells's name a much admired one with readers who desire these qualities



in a writer and who know that the modern voice in literature must have them or fail of its mission. But what interested us most in this admirable volume was his article on "The New Education," for in it were echoed some of our own thoughts. That Mr. Wells plays ducks and drakes with education as it obtains to-day in our universities and obtained in England before the war started, is greatly to his credit; and his denunciation of the sheer waste of time, which is every student's lot in his hope to master Greek and Latin and then fail to acquire more than a smattering of either language, is set forth in terms that burn into one's consciousness. One quotation should suffice to convince the reader of this criticism, of the wisdom of Mr. Wells's message on the new education: "Consider in what that educational process has consisted. Its backbone has been the teaching of Latin by men who can read, write, and speak it rather worse than a third-rate Babu speaks English, and of Ancient Greek by teachers who at best half know this fine lost language. They do not expect any real mastery of either tongue by their students, and naturally therefore no real mastery is ever attained. The boys and young men just muff about at it for three times as long as would be needed to master both those tongues if they had 'live' teachers, and so they acquire habits of busy utility and petty pedantry in all intellectual processes that haunt them throughout life."

P. S.

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The orthodox will cry out against "The Brook Kerith" by George Moore (The Macmillan Company, New York) and will write scathingly or speak scathingly of it. The Irish novelist has written a new and rather startling version of the life of "the gentle socialist of Nazareth," and the literary projectile he has flung audaciously into the camp of those secure in their belief of all that is told them in the gospels, clothed as it is in the magic words of the author, will not fall on insensitive minds or on those too obdurate to take note of its worth as a product of one of the best minds in England to-day. But aside from the controversies which are raging about this book and will continue to rage for some time to come, it may be said here, that no one who can appreciate the music of the English language, that no one whose ears are attuned to the nuances of words and phrases, should miss reading what George Moore has written in this work of much literary perfection. Artist in words he is, not of the Kipling or Masfield virility, but in the manner in which Chopin is the supreme artist in the world of music. Out of George Moore's crucible there flow limpid phrases of great purity, of a crystalline brilliance, of a finish and polish that should be the envy of all writers. He has written this sort of English in all his books, but never has he reached the 'top-notch' so often as in the book before us now. And on account of its perfection as a literary product everyone should read this book, and should learn what so few of us know:—that the English language when handled by a master is more beautiful than any other language in the world, not excepting French.

P. S.

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It would be a mistake to approach Vikenty Veressayev's "The Memoirs of a Physician" (Alfred A. Knopf, New York), in an American mood or in an English mood, for then the book would

be harshly judged and its good qualities would be lessened. The English-speaking person has a point of view that is sane and healthy, and just on account of its sanity and healthiness it is decidedly limited and impatient of things that are morbid. It can understand and grasp the everyday tragedies of life, but these tragedies must occur suddenly and in households that are thoroughly unprepared for them; but what it absolutely refuses to understand is the slow, gnawing tragedy that is bred of morbidity and undermines character with a relentless aim. Perhaps our saving grace is our innate sense of humor; perhaps it is our circumscribed lives approaching at times humdrumness; or perhaps it is our ambition to make 'good,' and our philosophical way of not being too greatly discouraged when we do not make 'good.' But with the Russians the way of looking at life is an altogether different matter, and each infinitesimal part has a bearing on the whole. This would not make their point of view altogether different from ours, if added to their manner of studying each subject and each life from every angle there was not a degree of morbidity that is closely allied to unhealthiness. There is no need to go any further into what constitutes our idea of what should be said in books and what constitutes a Russian's idea: the differences are too varied and too deeply rooted to be amalgamated. But even so, is it not possible to re-adjust our minds in such manner that justice can be done a book of the worth of "The Memoirs of a Physician"?

Let us suppose that you have read Chekhov and Dostroevsky and Gogol, and that remarkable novel of recent years, "Sanine," and that you have forgotten your English and American prejudices through great admiration for these writers. You have profited by your readings, and to all intents and purposes, for the time being, you are as Russian in your manner of thinking as it is possible for an English-speaking person to be. Now with this new mental habit on, we would urge you to read the book under consideration, not carelessly but in such manner that the author's words will burn deep into your consciousness. And if you are the physician we take you to be, you will see a partial portrait of yourself: an excellent description of your own experiences, a truthful if painful discourse on your ambitions, your frustrated hopes, your keen desires, and the futility of your small successes. The Russians can do this sort of thing better than any other people; they can envisage a whole subject and then visualize it for the reader's benefit with a surety that is admirable. Call them hysterics, masters of morbidity, realists whose gloom is too intense; call them by what name you will; you must admit that they are dauntless in looking things in the face and not blinking. True, their pictures of life are at times overdrawn, but it is better to have the paint thick and the colors somewhat lurid than the watery effects we get only too often in our own literature. But as we said above, one must be steeped in the Russian way of thinking, of judging, of philosophising, to appreciate a Russian book, and this is given only to a few; hence we fear that "The Memoirs of a Physician" will be classed by most readers as the silly utterance of a hysteric, who was a physical and moral coward and a disgrace to his profession. And more's the pity that this should be so.

P. S.



In "The Penny Piper of Saranac" (Houghton Mifflin Company, Boston and New York) we have a tribute by Mr. Stephen Chalmers to the memory of Robert Louis Stevenson, especially the Stevenson during his days at Saranac when he was Dr. Trudeau's patient. The author with reverent hands draws a picture of the distinguished consumptive, and shows us a modest, sensitive, suffering being with traits that are altogether different from what one has gathered from Stevenson's own published "Letters" pertaining to this period and from Henley's "Life." In the "Letters" there are very few complimentary words about Saranac and very few statements which show that Stevenson ever got on with Dr. Trudeau; but Mr. Chalmers assures us that though the two men had a number of controversies, and though Stevenson ran away from Trudeau's laboratory in great fear of the specimens of tuberculous organs removed from guinea-pigs, they managed to forgive each other and be friends again. Of course, it must not be overlooked that Stevenson was a genius with all the attributes of an exacting nature and, at times, with all the exaltations and depressions of the disease he suffered from, that Dr. Trudeau was a matter-of-fact physician who plodded to reach the goal that would cure consumption, and that the society of Saranac in the 'eighties was not just what a man of letters would call congenial: these are things that always go counter to what every genius demands. But whether Stevenson really appreciated what Dr. Trudeau did for him and for others, need not concern us here, since it is a fact that lesser men have been ungrateful for services rendered by medical men. The short essay of Stephen Chalmers is written in good faith and breathes his veneration for Stevenson. It is sane, and though tinged with praise it never overruns into adulation and extravagant flattery. Such a tribute, as is this, is a good counterblast, brief though it be, to the wilful untruthfulness and exaggerations of minor defects which make Henley's "Life" untrustworthy.

P. S.

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Physicians who have been enthusiastic about their pills and potions when it was a matter of 'toning up' their patients so that they could again engage in the battle of life, who have perhaps advised long walks or short walks, who have at times been moved to what they conceived was a most excellent idea—the shunting of their patients from their daily vocations or avocations into the quiet life of a sanatorium, only to learn afterwards that the measuring of each organ and the re-education of each left their patients in a decided dispirited condition, should read what Dr. George Van Ness Dearborn has to say on the subject of joy in his book "The Influence of Joy" (Little, Brown and Company, Boston). Of course it has been said by all of us, not once but many times, that we never allow things to worry us, and that when this incubus is about to descend on us we drive it off with a surety of aim that must add to our *amour propre*. Now we say all this because we consider it somewhat of a disgrace to be caught in a morbid condition or with nerves all awry; but even though our asseverations may be loud and long, we must confess that we are just a bit untruthful and gloss over those periods in our careers when the brightness of day and the brightness of all days to come is obscured by our lowered vitality, our nervousness and our rather dismal outlook. To combat this



state or rather to avoid it, we have the gospel of joy as set forth by the clever pen of Dr. Dearborn.

Novelists have depicted the man who had no appetite for breakfast or who conducted himself at that meal in so cheerless a manner that the manner approached boorishness. And novelists have also depicted with a degree of truth the depressing effects of morbidity on their heroes and heroines. In reading these characterizations, most of us, due perhaps to the author's skill as a student of the vagaries of human folk, have been enraptured with the truth of the portrait, and have even lived through the painful scenes and come out of the test with similar thoughts about the world at large. Or if we are not close followers of novels and are altogether too busy to waste any time on the lives of others, especially as they are dissected in works of fiction, we live our own lives so intensely, that before long we feel that we are 'out of sorts,'—that though the plaudits of our friends count for much, yet we are not as we should be; that perhaps we ought to play golf three times a week, 'get out in the open,' as the phrase goes, and thus seek the elusive anodyne that shall bring us peace of mind, a wonderful digestion and a high regard for our fellow-men! And all along the reader of novels who lives the life of the hero, the golfer who imagines that wielding his stick will bring back to his tired body and distraught brain a balm that shall heal all sores, is forgetful of the fact, that had he allowed optimism to enter more fully into his life, had he been aware that this article of faith, though old-fashioned and decried to-day, would have had a beneficent effect on his circulation, on his nutrition and on his nervous system, he would not have been so sensitive to the hero's mental and bodily anguish, or so fascinated and then disappointed because his thrice-a-week relaxation at golf or some other sport failed to endow him with the glow of youth.

There is much in Dr. Dearborn's book that is engaging and there is much that will make the reader ponder. The mere fact that daily, it might be said, we divorce joy from our manner of thinking, that we feel only too often that to be caught in a joyous mood would be detrimental to our standing in the community as reliable and dependable citizens, that a serious note in our conversation and also in our lightest judgments must be affected, otherwise our circle of friends will judge us harshly, should give us pause and at least make us think that though for material gain this may be the best attitude to assume, it may not be without harm to the delicate mechanism which constitutes the human system. The joyous person has gone out of fashion; and if we are to believe Dr. Dearborn—and there is no reason for doubting his word—with him have gone a vigorous and complete digestion, healthy nerves and a normal heart action.

P. S.

# ORIGINAL ARTICLES.

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## BENIGN PYLORIC STENOSIS AND ITS MANAGEMENT.

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AND

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### PART I.

#### ETIOLOGY, DIAGNOSIS AND MEDICAL TREATMENT.

By DR. SMITHIES.

Until August 1st, 1916, there had come under observation 8,581 patients with digestive upsets and upon whom gastric as well as general examinations had been made. My records demonstrate that 698 such individuals (8.1+ per cent.) were affected with some type of benign pyloric stenosis. Definite proof of the nature and degree of the pyloric narrowing was possible at laparotomy or autopsy in 622 cases (89+ per cent.). In the remaining patients, history, clinical examinations and subsequent course were reasonably definite toward establishing the non-malignancy of the ailment. The above special group of dyspeptic individuals comprises the material for this clinical consideration.

A. *Causation.*—The pyloric stenosis most commonly resulted from peptic ulcer, duodenal or gastric (84 per cent.). Occlusion of the gastric exit varied greatly in degree and extent: at times there occurred local or tubular constrictions amounting to nearly complete obstruction; again, patches of fibrous ulcer base were surrounded by dense, hypertrophied muscle bundles and excessively vascularized, edematous, areolar tissue and mucosa, with moderately patent lumen; or small, puckered ulcers resulted in marked tortuosity or fixation, the pyloric orifice being stenosed only as a consequence of inflammatory reaction about, and sometimes quite distantly removed from, the ulcer itself.

In the order of their frequency other causes of pyloric stenosis were gall-bladder disease and its complications, myomatoid hypertrophy of the pyloric and antral musculature, apparently consequent

upon long maintained pyloric spasm, gastric syphilis, enlarged peripyloric lymph-glands, ailments of the pancreas (chronic inflammation, cyst, gumma), cirrhosis of the liver, hepatic syphilis, hydro-nephrosis of right kidney, foreign body in the stomach, gastric myoma, pyloric polyp, volvulus (infant), cyst of liver, pyloric varicosities, aneurysm of abdominal aorta.

B. *Effects of Pyloric Stenosis.*

(a) *Local.*—The patency of all or part of the pyloric lumen is interfered with. The stricture may be so small as to but admit a probe. There may be several points of narrowing, with ampullæ-like spaces between. The stenosis not infrequently extends so as to involve the pyloric fourth of the antrum or the first third of the duodenum. Quite commonly, the actual narrowing of the pyloric channel as a result of tissue change in the wall of the stomach may be of relatively low degree, but when muscle spasm is associated with it, the stenosis may at times be nearly complete. Perforation, with gastric fixation or malformation, may further aggravate the local pyloric defect.

Pyloric obstruction cannot long continue, even of low grade, without a definite reaction taking place in the entire stomach. This reaction occurs as a consequence of a demand for increased gastric function. Not only must food be more than ordinarily chymified to facilitate its passage through a narrow exit, but extra muscular effort is needed in order that the chyme may freely negotiate the stenotic pylorus. Very early, are observed congested, thickened gastric mucosa, edematous areolar tissue and hypertrophied musculature. If the stenosis increases in degree, muscular hypertrophy reaches its limit and atony and dilatation of the stomach result. The mucosa and submucosa then become thin and atrophic. Persistent food stagnation follows.

(b) *General.*—Systemic malnutrition early becomes manifest. Dry skin, and mucous membranes, anemia, muscular flabbiness, loss of panniculus, weakness, decrease in weight, intestinal atony, diminution in urine output with mental sluggishness soon become apparent as a consequence of insufficient food assimilation, constant discomfort or pain or persistent loss of sleep.

C. *Symptomatology.*

(a) *Vomiting.*—The patient may have previously experienced occasional attacks of vomiting at the time of an aggravation of his dyspepsia. *The characteristic of vomiting associated with pyloric stenosis is that when the diet is of moderate quantity and normal consistency emesis is a routine and generally daily event.* Small, infrequent meals of the pap variety may for a long time mask the clinical evidences of pyloric narrowing and gastric dilatation. On such, a patient may actually gain weight and strength, and both he and his medical adviser may long remain under the impression that



cure of such a thing as a stenosing ulcer is being brought about. However, just so soon as a meal of ordinary size and character be given, retention is proved by prompt vomiting. Patients frequently find this out themselves. Doctors, not rarely, ignore this obvious effect of full feeding and consider the vomiting as being due to 'an indiscretion in diet.' The 'indiscretion' can often be laid to the medical adviser, for while he is relieving the patient after numerous 'indiscretions,' not infrequently pyloric stenosis is becoming more marked, gastrectasia of greater degree or accidents such as perforation, hemorrhage or malignancy are being catered to.

In pyloric narrowing, vomiting is usually daily and most common in the afternoon or evening. If dilatation of the stomach is pronounced and muscular weakness has supervened, then night vomiting or vomiting of large quantities of material several times weekly are commonly experienced. The characteristic feature is that instead of being an intermittent dyspeptic with only occasional periods of vomiting, the patient becomes a constant dyspeptic with regularly recurring vomiting when fed on food of ordinary bulk. In no type of gastric malfunction are cause and effect so markedly manifest.

The *vomit* is commonly copious. It is composed of poorly broken up lumps of food intermixed with mucus. Its *color* varies with the food eaten. Its *odor* is usually yeasty and but rarely acrid or rancid as in the event of malignant stenosis. The odor is generally so characteristically yeasty (indicating simple fermentation), that upon this observation a fairly accurate, rapid diagnosis between benign and neoplastic disease may be made. When stomach contents are not obtainable, then the yeasty odor of a chronic dyspeptic's breath has valuable diagnostic significance. The so-called 'old-fashioned' physician who made a routine practice of smelling the breaths of his gastric cases was certainly justified by so doing. It was possible for him to obtain considerable information quickly—certainly as much information as often follows many of our modern 'refinements of diagnosis.'

Evidences that food eaten longer than twelve hours previously *persistently appear* in the vomitus or gastric extracts indicate definite organic interference with the passage of food through the alimentary canal. The most common cause for such interference is benign pyloric stenosis. Pyloric spasm patients vomit retained food intermittently; pyloric narrowing always causes constant vomiting of stagnation contents when the patient is on a bulky diet. Pyloric spasm may be associated with pyloric stenosis. In such event while the quantity of the retention vomiting may vary at different examinations, the factor of food stagnation is a constant one.

Vomiting in pyloric stenosis is a painful act just so long as gastric musculature is not atonic. The pain is commonly most annoying previous to or during the emesis. When the stomach is emptied

the patient is usually comfortable. Gastric lavage may ward off attacks of vomiting. In this way, this procedure often assumes the dignity of a therapeutic or even curative manœuvre. While lavage is justified as a measure to make a sufferer comfortable, its ignorant use not infrequently for a long time masks the diagnosis and leads to the establishment of a sense of false security.

Constant vomiting limits body nourishment. *Weight loss* logically follows. In our cases of benign pyloric stenosis it averaged 21+ lb. The weight loss may be quite as great as in malignant disease. However, while pyloric stenosis patients usually look starved, they rarely have added to this unfed appearance the evidences of systemic poisoning which rapidly dominate the picture in malignancy. Only rarely does gastric stagnation of the benign type lead to intoxication of such marked grade as to produce *tetany*.

Persistent, copious vomiting depletes the body tissues of fluids. As a consequence, *diminished urine output* and *constipation* are common secondary symptoms in simple pyloric stenosis.

(b) *Eructations*, *pyrosis*, 'water-brash' and *regurgitation* were distressing enough as to warrant special attention in 57 per cent. of our cases. Commonly, these symptoms were more annoying later in the day than during the mid-afternoon. They were sometimes particularly severe at night, especially in that group of individuals whose stomach musculature was not of sufficient strength to permit easy vomiting.

(c) *Gross Hemorrhage*.—This occurred in 31 per cent. of our ulcer cases. Not rarely, bleeding followed excessive vomiting and retching. Only 3 patients succumbed to severe hematemesis.

When gastrorrhagia occurs in association with pyloric stenosis, the blood vomited may be mixed with food and mucus. It is commonly unclotted and has acid reaction. Later vomitus may be made up of large tough clots. It is generally alkaline and food free.

(d) *Pain*.—Some form of abdominal discomfort was experienced by 98 per cent. of our patients. When pyloric stenosis is associated with active, open, peptic ulcer, then the abdominal distress may be extreme. This may be largely due to excessive pyloric, gastric or duodenal spasms and not to food passing over the ulcer itself; the pain is often greatest when the stomach is empty. At such time, abnormally vigorous 'hunger contractions' occur, as pointed out by Cannon. Night pain, after emesis, may be so severe as to require opiates, particularly in the early stages of pyloric stenosis, when compensatory hypertrophy of the gastric musculature is being established.

When gastric atony with consequent stagnation has occurred, the abdominal discomfort is variously described as a 'load'—'fulness,' 'up-pressure,' 'bloat,' 'soreness,' 'ache,' etc.

### D. *Signs of Benign Pyloric Stenosis.*

I have already commented upon the systemic effects of benign narrowing of the pyloric orifice. It is only necessary to emphasize the evidences of emaciation without obvious cachexia, the dried out body-tissues, the weakness, anemia and the so-called 'dyspeptic facies': sallow, drawn face skin, exaggeration of normal wrinkles delimiting muscles of expression, dropped mouth corners, dried lips and lack-lustre, sunken eyes. Jaundice is rare. It may complicate a perforated pyloric ulcer, where the common duct is involved, an old gall-bladder ailment or an enlarged pancreas.

(a) *Visible gastric peristalsis* was a sign of diagnostic significance in rather more than 11 per cent. of our cases. It occurs as a consequence of a stout, gastric musculature endeavoring to force chyme through a narrowed stomach exit. When gastric atony and dilatation supervene, visible peristalsis is rarely present. In favorable cases, *i. e.*, where the abdominal wall is thin and peristalsis is vigorous, waves or bulges pass across the epigastrium or navel regions from left to right at a rate of from 3 to 7 per minute. The entire stomach contour may be definitely outlined to the eye. Not rarely, there is not a definite sequence of waves, but numerous, apparently uncoordinated, rounded epigastric bulgings. If the subject is thin and the observer's keenness of vision be properly intermixed with imagination, following strong peristaltic waves, a tumor may appear in the region where the pylorus is supposed to lie. In infants, affected with hypertrophy of the pyloric sphincter and stenosis, such a tumor appearing soon after food ingestion and before emesis, is of much value with regard to both diagnosis and prognosis.

(b) *Abdominal Palpation.*—*Tenderness* to pressure in the right, upper quadrant was noted in 79 per cent. of our cases. It was most pronounced in instances where the causes of the stenosis were active, or in perforating, peptic ulcer, distended gall-bladder, or in inflammatory disease of the peripyloric glands or of the pancreas. When fermentative processes are abnormally marked and the stomach is more or less constantly distended, the associated gastritis (and probably gastric myositis) results in the entire gastric zone being tender even to light palpation.

(c) *Palpable ridge or tumor* occurred in 18 per cent. of our patients. Such ridges were generally due to calloused peptic ulcer associated with much scar tissue or protected perforation. On several occasions a large gall-bladder, a group of swollen lymph-nodes or an inflamed pancreas suggested the probability of a neoplasm.

(d) *Splashy stomach* is commonly demonstrated when the stomach is partly filled with fluid contents and air, and when the gastric walls are atonic or not in active spasm.



### E. *Test Meal Observations.*

(a) *Motor Meal.*—Apart from the clinical observation of retention vomiting, no procedure is of greater diagnostic worth toward the proof of the existence of pyloric stenosis, than is the demonstration that test food persistently lies in a stomach longer than ten hours. A proper *motor test meal* must be composed of food that is palatable, harmless and *bulky*. Motor test meals of the baby pap variety are of little value. My routine procedure is to clean the patient's stomach by lavage and then administer 2 oz. of castor oil to empty the intestines. The latter facilitates accurate abdominal palpation. Two hours after the castor oil has been given, the patient is given a full dinner of foods that he likes. The meal must contain, however, two slices of cold meat (rare beef preferred) and two leaves of lettuce or stalks of celery. Milk or weak tea are allowed, but coffee, cocoa and chocolate are forbidden. Two hours after this meal has been eaten, the patient is directed to eat 20 raw raisins. The skins particularly are swallowed. If the patient vomits, note is made and the vomitus is saved for examination. No other food is given. Twelve hours after the dinner has been eaten and ten hours after the raisins have been given, the stomach is emptied with the aid of a tube of large calibre. A tube of small calibre may empty the stomach of fluid contents, but leave behind retained material that has been poorly broken up. Gastric lavage with an abundance of warm salt solution should always follow the securing of the fasting stomach contents. If such is not carried out then stagnation material retained in loculi (perforation crater, hour-glass, diverticulum, etc.) may be missed or mucus-mixed, firm food masses lying deeply in low, atonic stomachs be left behind.

*Interpretation of motor meal results* by the above procedure is comparatively simple. If food is *constantly* found to lie in the stomach for longer than ten hours, the cause lies commonly in some form of organic obstruction. This is, in nine cases out of ten, pyloric or antral in situation, and the stenosis is most frequently due to chronic, calloused, peptic ulcer. If, *only intermittently* ten-hour retention is found, then spasm (gastric, pyloric or duodenal) atony, ptosis, constipation or neurosis exists with or without a non-stenosing, organic lesion.

*Analysis of Retention Contents.*—The average free HCl was 18. The average total acidity was 43. *Lactic acid* was present in less than 2 per cent. *Blood* by benzidin test was demonstrated in 22 per cent. Positive tests frequently resulted from food admixtures to the gastric extracts. *Fatty acids* were present in nearly 5 per cent. of stagnation extracts (heat test).

*Microscopic Examination.*—Food rests of all kinds are common in stagnation. Special search should be made for slightly altered, striated muscle fibres remaining from the meat given in the motor

test meal. Plant cells, remains of lettuce, celery or raisin skins are usually identified without difficulty. The *chief characteristic* of benign stagnation contents lies in the enormous number of actively budding *yeasts* and thickly grouped *sarcinæ* seen microscopically. Such indicate simple, fermentative processes, and are to be sharply differentiated from the bacteria-loaded contents obtained from instances of malignant pyloric stenosis. In all the retention contents of our cases of benign pyloric stenosis, budding yeasts were observed; in the stagnation cases the yeasts literally cover the microscopic field. In 76 per cent. of the stagnation extracts, *sarcinæ* (large or small type) were prominent. They usually lay in irregularly jumbled groups, or formed symmetrical 'cotton-bale' masses, often beautifully delimited. It was noted that the abundance of *sarcinæ* was in direct ratio to the degree of gastric atony and dilatation.

(b) *Secretory Meal*.—Facts derived from the commonly used test meals to determine gastric secretion are of comparatively little value in establishing the existence of benign pyloric stenosis. This is especially the case if the stomach has been thoroughly cleansed by lavage before the secretory meal is given. By the Ewald or the Dock meals, the variations in gastric acidity are so great as to mean little or nothing clinically. In late stagnation cases achylia may often be encountered. In early stenosis with peptic ulcer, the cause, normal or increased free acid values, may be obtained. The *quantity* of the removed test meal is generally greater than that recovered when the pylorus is freely patent. The amount removed by the tube is rarely less than 100 c.cm. It often amounts to much more as a result of mucus admixtures or an exuberantly secreting gastric mucosa. These findings are not, however, characteristic for benign pyloric stenosis. They are common in other types of gastric ailment.

#### F. Roentgen Evidence of Benign Pyloric Stenosis.

*Motor Meal*.—A bulky, heavy meal composed of barium or bismuth, impregnated mush finds difficulty in passing a narrowed pylorus within the arbitrarily established six-hour period. This difficulty is especially aggravated in cases where a long maintained pyloric stenosis has resulted in fatigue and atony of the gastric musculature with subsequent dilatation of the stomach. In such an event a large amount of the metal-mixed, motor mush may remain in the stomach for days. Fluoroscopic examination or plates may readily prove such retention.

*Observation Meal*.—When the stomach is filled with a bismuth or barium suspension, abnormalities in contour, size or position or fixation of the pyloric zone can often be shown at the fluoroscopic examination. The stomach is generally enlarged. Peristalsis may be vigorous in recently established benign pyloric stenosis, but

where the narrowing has existed for some time, peristalsis is weak or absent.

The *bulbus duodeni* may be poorly outlined, either as result of insufficient filling from the narrowed gastric exit or as a consequence of intra- or extra-duodenal disease. The pylorus is sometimes of normal calibre, but the stenosis occurs in the first third of the duodenum itself. Fluoroscopy not infrequently permits of the demonstration of the approximate location of the cause of the pyloric stenosis, particularly with respect to its gastric or extra-gastric situation. Prognostically, this information is often very valuable. It likewise assists surgeons in planning operative relief. Plates or films of the barium or bismuth filled stomach, furnish interesting visual records of the shape, size, position and contour of the altered stomach and duodenum. They may demonstrate foreign bodies, gall-stones or cysts. Their limitations as complete records of the status of the case can only be appreciated by comparison with the laparotomy, autopsy or pathological findings.

#### G. *Treatment.*

Except when lues is the etiologic factor any therapeutic course other than surgical is but palliative. Improvement upon limited or liquid diet frequently occurs, but such improvement is largely symptomatic; the stenosis remains and may become of greater degree. The possibility of malignancy supervening must be constantly borne in mind.

(a) *Palliative Treatment.*—Gastric lavage, preferably performed at bedtime, prevents fermentation of stagnant food, night pain and vomiting, and exhaustion from chronic loss of sleep. Patients are readily taught to wash their own stomachs. Some prefer this type of relief to the hazard of a laparotomy. A lavage fluid giving excellent results is warm Carlsbad water. (A drachm of artificial Carlsbad salts to a quart of water at about 30° C.). Lavage is quickly and thoroughly performed by the aid of the special tube which I suggested several years ago. In cases where there is marked hypersecretion, with excess of tough mucus and associated gastric atony, lavage may be needed both night and morning to insure the patient's comfort.

*Diet.*—Six to eight feedings daily of creamed vegetable soups, strained, or of well-cooked cereals or finely divided vegetables are generally well borne. Care must be taken to see that at least 2,500 calories of food actually pass through the pylorus each twenty-four hours. If the pyloric stenosis is not of marked degree, soft eggs, custard, jellies, or minced meats may be tolerated. Limitation should, however, be placed upon the proteid and fat ingestion.

Cases of mild stenosis with marked gastric irritability sometimes do well upon direct feeding into the duodenum by means of one of the commonly used tubes for such purpose. Duodenal feeding



should not be carried on, however, simply because it is a novel and unusual type of alimentation. Very often duodenal tubes do not leave the stomach, and food injected through them enters the duodenum through the common channel.

If sufficient food cannot be tolerated by mouth, then rectal feeding should supplement oral nourishment. We have found most satisfactory a nutrient solution composed of the following:—

Glucose.....	30
Alcohol (50 per cent.) āā	
Sol. NaCl—(N) q.s ad.....	240

Such solution may be given several times daily by the drop method.

*Medicinal.*—Irritability of the stomach is best controlled by gastric lavage. Where there is marked peristaltic unrest, orthoform gr. x administered when the viscus is empty is often of much value. Bromides, atropine and alkalies are frequently useful, particularly when such are combined with a proper dietary. The bowels may be kept open by morning doses of hot sodium phosphate solution, evening doses of petrolatum liquidum or appropriate enemata. The anemia may require iron and arsenic. Convenient ampoules for their painless hypodermic administration are available on the market.

## PART II.

### SURGICAL TREATMENT.

By DR. OCHSNER.

Clinical experience has proved many times that an apparently unchangeable cicatricial obstruction of the pylorus, which seems so complete that nothing but surgical treatment appears to be of any benefit, may still heal spontaneously, provided the pylorus is left free from irritation for a considerable period of time. This has been demonstrated in our own experience by a large number of cases in which at the time of the operation the cicatricial contraction of the pylorus caused almost a complete obstruction, so that it seemed certain that food would never again pass into the duodenum through the pyloric orifice. A number of these patients were operated later for other conditions, and in several instances the pylorus had been restored to an almost absolutely normal condition.

Whether such a perfect restoration could have occurred in the absence of the gastro-enterostomy operation, cannot be proved, because in cases in which a diagnosis of cicatricial obstruction had been made previous to the use of systematic, non-surgical treatment, there must always remain a doubt as to the exact extent of the pyloric obstruction. Consequently, our judgment in this class of cases must be based upon conditions which contain an important

element of inconstancy. What we have personally observed is, however, sufficient to indicate caution regarding statements to the effect that in any individual case, surgical treatment is the only form which can possibly overcome the existing difficulty in the case under consideration.

There can be no doubt but that in a considerable number of cases, especially in those who continue to lose weight under the most careful non-surgical treatment, so far as this has been developed to the present time, we must depend upon surgical relief in order to save the life of the patient. This relief must provide several distinct conditions:—

1. It must make it possible to carry a sufficient amount of food into the intestines to nourish the patient properly.

2. It must prevent the decomposition of food in the stomach which is due to retention.

3. It must permit the mixing of bile and pancreatic fluid with the food in a manner that will insure proper digestion.

4. It must provide conditions which will prevent the occurrence of regurgitant vomiting, commonly known as 'vicious circle.'

5. The character of the operation must be such as not to cause a greater amount of shock than can be borne by patients in a condition of bad nutrition in which these patients usually come into the hands of the surgeon.

6. It must provide a mechanism that will be permanently satisfactory from the physiological standpoint.

In order to obtain an opening sufficient to carry the food from the stomach to the intestine, the posterior short-loop gastro-enterostomy between the greater curvature of the stomach and the jejunum, seems to have obtained permanent recognition. This operation should be performed with needle and thread. The opening should be at least 5 cm. in length, and in case the stomach has been enormously distended, then it should be at least 7½ cm. in length, in order that when the stomach walls become contracted the communication may not be too small. Care should be taken to place the jejunum and the stomach in such a relation that there can be no kinking of the former after healing has taken place. It will not be possible for food to remain in the stomach with such an opening for a longer time than it will take for the intestines to take it up and utilize it. Consequently, it will not be possible for decomposition to take place.

The location of this anastomosis should be made at the lowest point of the greater curvature, as near the pylorus as possible, because this will prevent at once regurgitation of bile into the stomach, according to the principle laid down by W. J. Mayo nearly twenty years ago, and it will prevent the tendency of the stomach contents of being forced through the contracted original pylorus, as has

been shown by the experiment made by Professor Hartman, of Paris. In passing from the duodenum into the jejunum, the bile and pancreatic juice will, of course, pass the gastro-enterostomy opening and a small amount of this fluid will mix with the contents of the stomach at this point, but the alkalization of the gastric contents by this fluid has been looked upon as a favorable condition by many clinicians. It does not seem to cause distress to the patient; neither does it seem to interfere with normal digestion.

On the other hand, if the gastro-enterostomy opening is not placed at the lowest point in the stomach, so that a considerable quantity of bile and pancreatic juice may accumulate in the sac-like portion of the stomach, which in these cases is lower than the gastro-enterostomy opening, then the presence of such an accumulation of bile and pancreatic juice will act as a violent irritant and will cause persistent vomiting, known as 'vicious circle.'

This precaution of placing the opening at the lowest point in the stomach undoubtedly also prevents the occurrence of peptic ulcer in the jejunum at the point of the gastro-enterostomy opening. This has been proved in our experience by the fact that, since we have invariably made this opening at what appeared to be the lowest point in the stomach, we have observed only a very small number of peptic ulcers in the jejunum, and upon reopening these cases we have found one of two conditions. Either the gastro-enterostomy opening had not been made at the lowest point of the stomach, and consequently, it was possible for the irritating acid gastric juice to accumulate in the sacculated portion of the stomach, and when this was forced out into the jejunum, it caused the irritation which resulted in peptic ulcer. The second condition which we have encountered in these cases, consisted in interference with the circulation at the point of gastro-jejunosomy, affecting the walls of the jejunum, and this in turn reduced the resistance of the mucous membrane of this organ and thus served as a predisposing cause to the formation of peptic ulcer.

The element of shock can undoubtedly be reduced to a minimum by gentle manipulations and by limiting the time of operation. In case the patient's condition does not seem to warrant an extensive operation, only a gastro-enterostomy should be performed at the time of the first operation. If it seems necessary to close the pylorus permanently, then this may be done at a second operation, because the patient's strength and resistance will rapidly increase after the gastro-enterostomy has been performed, so that the second operation will be borne without any difficulty.

The permanency of the result will depend upon the care with which the steps have been carried out, which have already been described, and to some extent upon the permanent closure of the pylorus, and above all things, upon the careful control of the patient after recovery from the operation. These patients are notori-



ously erratic in their selection of food and careless concerning mastication, the care of their teeth, and the regularity of taking meals. Consequently, it is important after the recovery from operation, to insist upon long-continued, careful regulation of the diet.

In case the patient's strength warrants the additional manipulation necessary for closing the pyloric opening by section of the stomach at a point 1 to 2 cm. to the left of the pylorus, it is probable that this step is always indicated. If, however, the patient's strength does not seem to warrant it, this step may be postponed until a later time, when it can be performed with safety.

Recently Straus has introduced an operation consisting in a longitudinal incision over the pyloric end of the stomach, passing through the peritoneum and muscular layer for a distance of from 3 to 5 cm. Then the mucous membrane is shelled out of the muscular layer and a strip of fascia 1 cm. wide and 6 to 8 cm. long is cut out of the anterior fascia of the rectus abdominus muscle and this is sutured about the mucous membrane just tightly enough to completely close the mucous membrane against the passage of food from the stomach into the duodenum, but not tightly enough to cause pressure necrosis.

In dogs this operation has been enormously satisfactory. In the human patient it is quite difficult to separate the mucous membrane from the muscular layer. If the mucous membrane is torn, no harm is done, because the ordinary section of the stomach at this point can then be made and the mucous membrane inverted into the stomach on the one side, and into the pylorus on the other. Then the two ends are sutured together by Lembert sutures. In case the operation suggested by Straus does succeed, then after the fascia has been sutured in place, the abraded surface is covered by means of Lembert sutures. We have performed the operation twice in the human subject and have found it eminently satisfactory.

Occasionally we have found an obstruction which was plainly due to an abnormal accumulation of circular muscle fibres and connective-tissue in the region of the pylorus so that these tissues stand out as a heavy ridge. In these cases we have made a transverse section through these fibres without carrying the incision through the mucous membrane, but only just enough to leave the mucous membrane quite intact. Then the peritoneum is sutured over the surface transversely. In appropriate cases, and especially in children, this method is exceedingly satisfactory.

It seems important in all these operations to reduce the traumatism to the very slightest amount in order that these patients, who are already weakened, may not be overburdened by the resulting shock.

Whatever surgical treatment is given, however, we have found it exceedingly important to give every patient carefully worked out, written instructions regarding their diet and general mode of living, not only during the period of convalescence, but for all time to come.

## ANKYLOSIS OF THE JAW.

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A REPORT OF TWENTY-THREE CASES FROM THE CLINIC OF THE LATE  
DR. JOHN B. MURPHY.

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By PHILIP H. KREUSCHER, M. D., of Chicago.

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It was my very rare fortune to have been associated with Dr. Murphy during the last seven years of his activity, and to have assisted him in his bone and joint work, of which the operation for the relief of ankylosis of the jaw was such an important part. I can safely say that there was no operation which gave him more pleasure and satisfaction than this one.

A review of 23 cases of ankylosis that occur in or about the temporo-mandibular articulation permits us to make the following classification:—

- (a) Bony ankylosis of the temporo-mandibular articulation.
- (b) Fibrous ankylosis of the jaw.
- (c) Ankylosis due to cicatricial fixation about the joint.
- (d) Fixation of the jaw due to intra-alveolar buccal adhesions.

The evolution of the operation for the relief of ankylosis takes us through seven distinct stages, namely:—

1. The formation of flail joints, especially of the shoulder and elbow (Langenbeck, Ollier, Julius Wolff, and others). These were desired sequences following resection of tuberculous and syphilitic joints, and joints destroyed by pus infections.

2. The restoration of motion in a bony ankylosed joint by the intra-position of muscle and fibrous tissue between the separated ends at the joint, as in the mandible (Helferich, 1893).

3. Pseudo-arthritis developing after bone operations in the neighborhood of joints (Lorenz).

4. The transplantation of pedicled flaps of fascia, fat and capsule with the production of movable sliding serous surface joints (Murphy, 1902), in the mandible, shoulder, elbow, wrist, finger, hip, knee, ankle and toe articulations.

5. The homo-transplantations of the articular ends and surfaces of the bone (Lexer, 1906), particularly in the knee.

6. The transplantation of flaps of fat and fascia, which have been detached (Lexer).

7. The interposition of foreign material to make the joint, from Paens' metallic joint down to Kraske, Baumgarten, Roser, and Baer's hetero-visceral implantations.

The *fourth* stage as outlined by Murphy is a transplantation of pedicled flaps of fascia with fat and capsule. It is the one which has given practically one hundred per cent. movable joints in Dr. Murphy's work and is applicable in nearly every joint of the body where the peri-articular tissues have not been destroyed by some previous operative procedure or destructive pathologic process. It would be gratifying and often advantageous if the free fascia and fat transplantation of Lexer, mentioned under stage 6, would with future experience sustain the good results which its originator predicts for it. Judging from Dr. Murphy's experience, he believed that it will not meet the requirements in the weight-bearing joints.

The insertion of foreign material or heteroplasties is doomed to disappear from this field of work, as experience has shown that foreign absorbable material, if *aseptic*, must eventually be supplanted by connective-tissue. While it is possible that a flexible flail joint may result from such an operation, a movable sliding joint cannot be obtained from such an interposition. The foreign material when it becomes *septic*, is always a detriment rather than an aid in the formation of a movable joint. Non-absorbable metal materials can be serviceable only under very few favorable conditions. (See experiments of Chlumsky.)

In Murphy's work on arthroplasties of the jaw the cases may be divided as stated above, namely:—

(a) The intra-articular bony ankylosis (true ankylosis); (b) the intra-articular fibrous ankylosis; (c) sub-zygomatic cicatricial fixations; (d) inter-alveolar buccal fixations.

Under *c* belongs the fixation in the sub-zygomatic area, resulting in scar tissue, which binds the coronoid process to the cranium. Under *d* belong the cicatricial fixations due to the sloughing of muscle and mucosa in the mouth or cheek.

#### ROUTES OF INVASION.

Murphy described four routes of infection invasion into or surrounding the temporo-mandibular articulation, namely:—

First and most frequent, an extension of the suppuration from the middle ear (Cases I, IV and VII).

Second, an osteitis or osteomyelitis of the mandible extending into the glenoid cavity.

Third, the metastases from foci of infection within the mouth or elsewhere in the body (Cases II, III, IX, X, XIX and XX), or part of general metastatic arthritis (Case XI).

Fourth, ankylosis may result from a transmitted trauma from the tip of the chin to the articulation, giving a traumatic osseous fibrous arthritis (Cases VI, XIV, XV and XVII).

The glenoid cavity alone may be involved in the ankylosis, or the



bony bridge may extend forward to include the zygomatic and coronoid processes.

The most common cause of the ankylosis is a middle ear sup-puration in which the infection may pass in five different directions: First, backward into the mastoid; second, through the posterior wall of the petrous bone into the posterior cerebral fossa; third, it may penetrate the attic of the ear and form an abscess in the middle cerebral fossa or rupture externally just above the tip of the ear; fourth, it may burrow forward and rupture into the glenoid cavity or pass over the base of the zygomatic process into the mandibular articulation; fifth, it may burrow forward into the sub-zygomatic temporal muscle and produce an extensive phlegmonous myositis with subsequent cicatricial contraction, binding the coronoid process and inhibiting mandibular motion.

In the cases of peri-articular fixation the condition is usually caused by a sloughing of the mucosa of the cheek, such as follows typhoid fever, scarlet fever, measles, infection of the alveolar processes, or infection of the scalp or cranium, or infections from the mouth into the temporo-mandibular fossa, which produce a destruction of the fascia and temporal muscle.\*

#### DIAGNOSIS.

In the osseous type or firm fibrous type the diagnosis as to which side is involved is often extremely difficult. However, in nearly all the cases one is able to detect the ankylosed side from a close study of the physical findings, which were described by Murphy as follow:—

1. There is a flattening of the jaw on the unaffected side, most pronounced near the tip of the chin. The side which appears normal is the one which is involved in the ankylosis and the flattened side is the one in which the joint is not fixed.

2. When the patient attempts to open his mouth, the teeth move from 1/60 to 1/100 of an inch downward and deviate a little in the direction of the ankylosed side. This is due to a sliding forward of the mandibular articulation on the unaffected side, as the muscles of the neck are put on tension in the effort made to open the mouth.

3. A sliding motion on the unaffected side can be felt by the palpating finger, and the muscular activity on that side is very much greater on attempted opening and closing of the mouth than on the ankylosed side.

4. The muscles on the ankylosed side are more atrophied than those on the unaffected side.

5. The distance by measurement from the lower edge of the

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\*Murphy: Use of Palate Mucous Membrane Flaps in the Ankylosis of the Jaw, Due to Cicatricial Formation in the Cheek. (*Jour. Amer. Med. Assoc.*, July 26th, 1913, p. 245.)

zygomatic arch to the lowest point on the ramus of the jaw is less on the affected side than on the well one. This is true especially when there has been some destruction of the upper end of the mandibular articulation or when the ankylosis occurs in infants or children. As a general rule, the earlier the ankylosis has occurred in life the greater the deformity of the face, due to the fact that the epiphysis of the condyle is the means through which the ramus grows in length. The growth is arrested by the ossification across the epiphyseal line before the normal time for ossification at this point, which is in the fifteenth year.

#### DETAILS OF THE OPERATION.

The technique of the operation as originally described by Dr. Murphy\* and later improved by him is as follows: In all the cases of ankylosis of the jaw of the intra-articular type the operation has been a typical and uniform arthroplasty, employing the pedicled flap consisting of the aponeurosis of the temporal muscle and fat. In the earlier operations the flap was fixed by suture to the connective-tissue and internal portion of the capsule. Now the flap is fixed at the basal angles only, thus avoiding the danger of injuring the internal maxillary artery, an accident which was encountered in one of the early cases. The joint is exposed by a perpendicular incision just in front of the ear, extending from one and one-half inches above the zygoma in the hair-line downward to the lower border of the zygomatic (Fig. 1). This incision then curves forward on the superior margin of the zygoma for a distance of about three-fourths of an inch and then curves upward slightly so as to avoid injuring the temporal and orbicular branches of the facial nerve. This leaves a very slight scar, most of it being hidden in the hair-line. It gives better access to the joint than does the perpendicular incision and is an improvement on the incision which was made several years ago.

Various means have been devised for dividing the head and neck of the mandible at the line of bony ankylosis—including chisels, Gigli saws, and olive-tipped dental burrs driven by electric motors. The last are much more rapid, but on the whole not so satisfactory as the chisel. It is needless to point out that the greatest caution is necessary in the use of the chisel and burr because of the close proximity of the internal maxillary artery and also the brain, which is separated from the head of the mandible by a very thin transparent plate of bone only. To avoid the injury mentioned, Murphy had devised special periosteotomes, the tip of which passed directly beneath the neck of the mandible and lay between that and the in-

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\*Murphy: Arthroplasty for Intra-articular Bony and Fibrous Ankylosis of the Temporo-mandibular Articulation. (*Jour. Amer. Med. Assoc.*, June 6th, 1914, Vol. LXII.)



Fig. 1.—The line of incision and the bony outlines at the point of ankylosis.



Fig. 3.—Special periosteotomes in position.

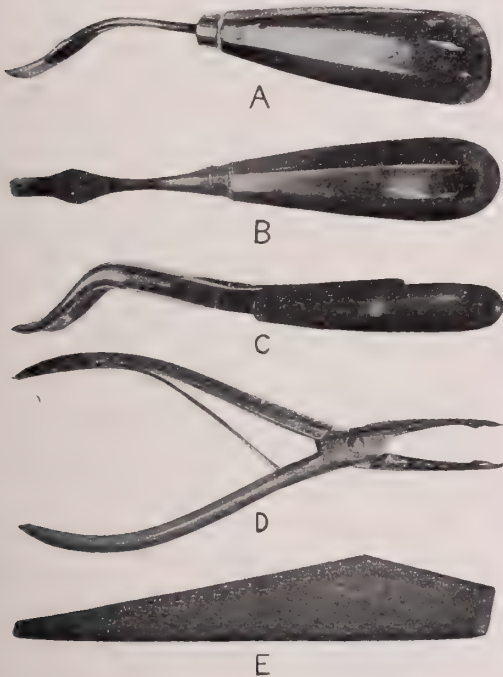


Fig. 2.—A, B, Dr. Murphy's periosteotome, side and back view (somewhat reduced); C, D, bone-cutting forceps or nippers, side and front view (somewhat reduced); E, the interdental block designed by Dr. Murphy to maintain the desired spread of the jaws. It is made of wood, and since it is wedge-shaped, the degree of opening can easily be regulated by withdrawing or pushing in the block.

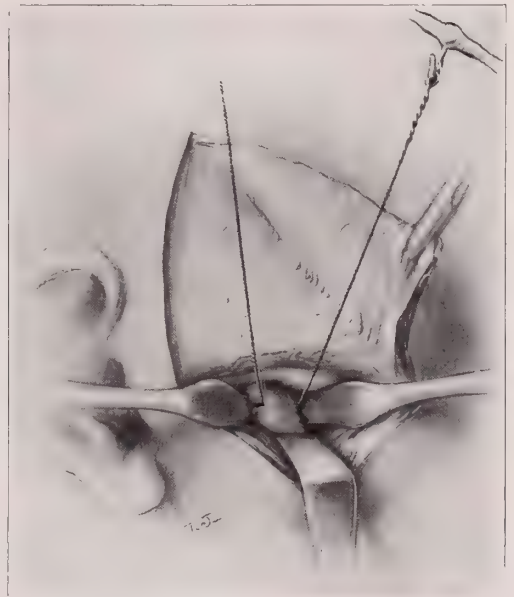


Fig. 4.—The Gigli saw used to divide the mandible.





Fig. 5.—The gap left after the exsection, with the curved periosteotomes still in position.

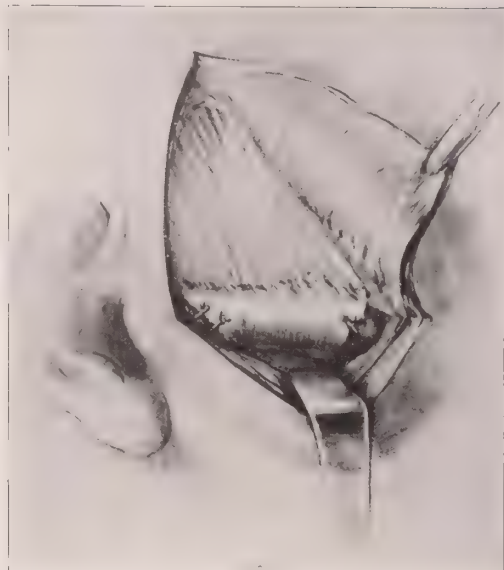


Fig. 7.—The flap is now in place and the wound ready for closure.



Fig. 6.—The temporal fascia and fat flap freed and ready for insertion.

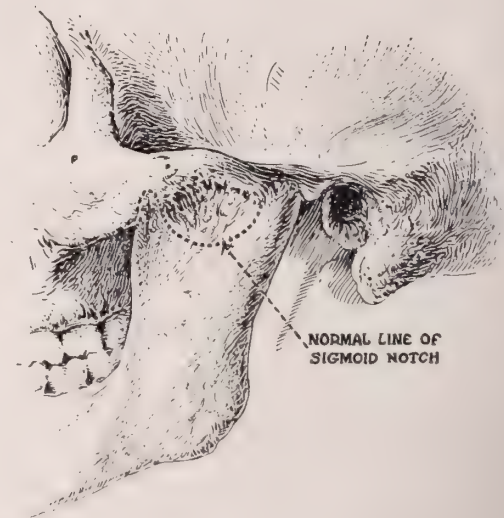


Fig. 8.—Showing how the sigmoid notch is entirely filled with new-formed bone. (See Case XXII.)



Fig. 9.—Showing the marked flattening on left side.



Fig. 10.—Showing the marked recession of the chin.



Figs. 11 and 12.—Result at the end of six months.



Fig. 13.—Showing fixation of jaw before operation.



Fig. 14.—The degree of voluntary separation of the jaws four weeks after operation.



Fig. 15.—Showing flattening on left side.



Fig. 16.—Showing result of operation.

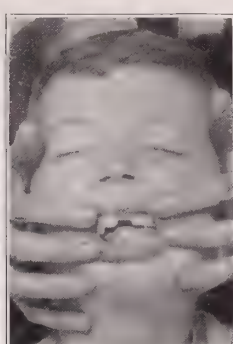


Fig. 17.—Fixation of jaw before operation.



Fig. 18.—Separation of jaws three weeks after operation.



Fig. 19.—Showing flattening on right side of face.



Fig. 20.—Showing result after second operation.



Fig. 21.—Showing result after second operation.



Fig. 22.—Shows fixation and deformity of jaw before operation.



Fig. 23.—Showing result six months after operation.



Fig. 24.—Showing flattening of left side.



Fig. 25.—Result two years after operation.



Fig. 26.—Showing fixation before operation.

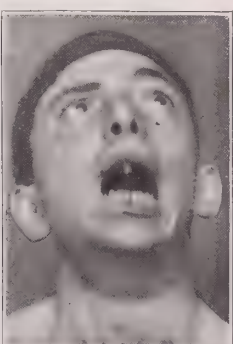


Fig. 27.—Showing result six months after operation.



Fig. 28.—Showing flattening on left side.



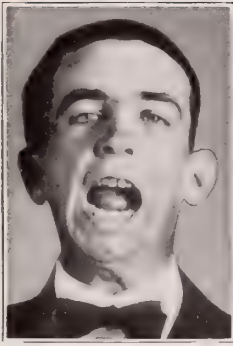


Fig. 29.—Result nine months after operation.



Fig. 30.—Showing fixation of jaws before operation.



Fig. 31.—Showing result after operation.



Fig. 32.—Showing fixation and flattening of right side.

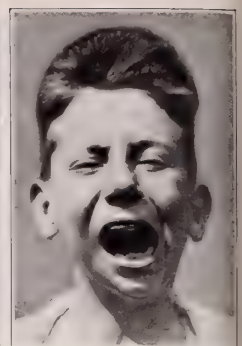


Fig. 33.—Showing result after operation.



Fig. 34.—Showing fixation of jaw before operation.



Fig. 35.—Showing result four months after operation.



Fig. 36.—Showing marked recession of the chin.



Fig. 37.—Showing marked deformity before operation.

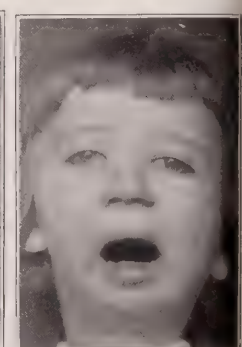


Fig. 38.—Result two weeks after operation.



Fig. 39.—Showing fixation and deformity before operation.



Fig. 40.—Showing result three months after operation.



Fig. 41.—Shows flattening of unaffected side of face.



Fig. 42.—Showing result three months after operation.



Fig. 43.—Showing fixation before operation.

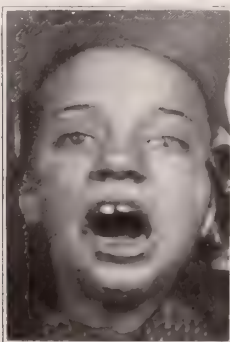


Fig. 44.—Showing result ten days after operation.



Fig. 45.—Showing extent of fixation of jaw.

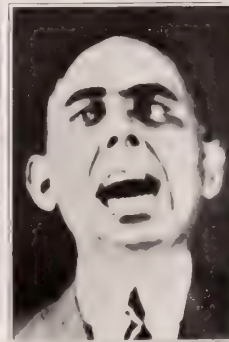


Fig. 46.—Showing result four weeks after operation.



Fig. 47.—Showing result two weeks after operation.



ternal maxillary artery. One periosteotome is placed in position from each side, and all the bone lying anterior to them may be cut without any danger (Fig. 3). Bone-cutting forceps or nippers may also be used and are more convenient than the chisel for smoothing off the surface of the bone (Figs. 2-C and D). The Gigli saw may be used in dividing the mandible (Fig. 4).

After the incision has been made as described above, the edges of the wound are drawn downward, the lower lip being displaced below the lower border of the zygoma. This gives a good exposure of the joint. The tissues are then pushed away with the special curved periosteotome (Figs. 2-A and B) all around the anterior surface of the line of union, and further separated with a similar instrument around the posterior surface. When the bone is laid bare, the two instruments are passed behind the neck of the bone, one on each side, so that when they are in place they completely encircle the neck of the mandible behind, hugging close to the head, holding the soft parts retracted during the excision of the bone (Fig. 3). The insertion of these instruments and their retention in position during the excision of the bone formed the key to the success and safety of the operation. Injury to the internal maxillary artery, which closely hugs the neck of the mandible, is thus avoided. The retraction of the soft tissues brought about by these instruments keeps the field wide open during all the work. The chisel or burr then removes a section of bone one-half inch wide clear across the neck of the mandible (Fig. 5). This must be done carefully and ample bone must be removed so as to admit of the free insertion of the interposing flap of fat and fascia (Figs. 6 and 7). The periosteum should be excised with the bone. The deeper fragments of bone can be taken out with a small rongeur (Figs. 2-C and D). If one desires to use the Gigli saw for dividing the neck of the mandible, a small full-curved aneurysm needle carrying a silk thread may be passed around the neck between it and the periosteotome. This thread acts as a carrier for the Gigli saw. The difficulty of inserting the saw is slight, but the acute angulation of the wire which necessarily occurs, occasionally causes it to break, putting one to the inconvenience of replacing it. On the whole we do not believe that it is handled quite as easily as the chisel. As soon as the bone is completely divided, the mouth can be opened readily by the anesthetist. The interposing fat and fascia flap should now be prepared. If necessary, the perpendicular incision is extended up on the temple, say from one and one-half to two inches. Then a U-shaped flap of fat and fascia is taken from over the temporal muscle. This flap is about one inch wide and two inches long and has its base at the upper margin of the zygoma. It is freed from above downward, folded downward over the zygoma and packed into the bony gap previously described. It is retained in

position by a few catgut sutures at its anterior and posterior basal angles (Fig. 7). The skin wound is accurately closed with horse-hair, dusted with bismuth subiodide and sealed with collodion on gauze or cotton. No other dressing needs to be applied.

No special effort should be made at this time to spread the jaws, as it is important that the lower jaw should remain steady on the well side in order that the wooden block (Fig. 2-E) inserted on the diseased side may maintain the wide separation of the molar teeth until the interposing flap has healed in. This block also prevents the muscular contraction from compressing and necrotizing the flap.

After much experience with arthroplasties, it has been learned that a hematoma very often forms about the field of operation, and if permitted to remain, will be disastrous to the result, the same as it would be in the knee- or in the hip-joint. A hematoma following an arthroplasty is a disadvantage in three ways: First, it may necrotize a portion or all the interposing flap; second, it may necrotize the skin overlying the operative field; third, and most important, it acts as a splendid culture medium in which organisms may grow and thence become destructive. To avoid such sequelæ it is important that the condition of the wound should be watched very carefully after the operation. If there is the slightest evidence of a hematoma, a small hypodermic or aspirating needle is inserted and the blood is drawn off. This may be repeated on the second day, and again on the third and fourth days or even more often if necessary.

### RESULTS.

The results obtained in Murphy's cases have been uniformly satisfactory. The operation was considered by Murphy to be one of the most gratifying in bone and joint surgery as far as results are concerned, and one of the easiest of execution. The one failure, reported at the time the original article was published, was not an ultimate failure. It has since been re-operated and has given a perfect result (Case VI). Since publication of the original article one other case showed evidences of almost complete failure, but was also re-operated with a perfect result (Case VII).

The *speculative reasons* for the failures following the first operation may be enumerated as follow:—

1. Possibly not all the periosteum was removed with the bone.
2. There may have been an absorption of the interposing flap with ossification of the newly formed connective-tissue, as occurs in detached fascia lata flaps in arthroplasties on the knee and other joints, or possibly it was due to the fact that the interposing flap was too short, and that the cicatricial connective-tissue formation, which takes place after the operation, retracted the tip of the flap

from the position where it was placed, thus leaving two bony surfaces to re-unite. We are convinced that the real cause for the recurrence of the ankylosis in the 2 cases cited above was the fact that the parents did not carry out the instructions as to maintaining the wooden plug in position after the patients left the hospital.

We have found that the position in which this wooden plug is held is of considerable importance. If the wedge is placed between the upper and lower *incisors* the jaws are kept apart, but the pressure which is necessarily exerted upon the flap by the neck of the mandible, with the masseter muscles acting as a fulcrum, must eventually destroy at least a portion of the flap which has been interposed. If, on the other hand, the wedge is passed backward between the upper and lower *molars*, the jaws are kept apart, with the additional advantage of keeping the freshly made bony surfaces from lying in apposition. In other words, the wedge serves the same purpose in husbanding the flap as the Buck extension does in arthroplasties of the knee, hip and shoulder.

In the 3 cases of extra-articular fibrous fixation Dr. Murphy employed the method which we believe is original with him. It consisted in the utilization of mucous membrane pedicled flaps taken from the hard and soft palates and the tongue margin of the buccal mucosa, as an interposing medium between the divided cicatricial connective-tissue masses, for the purpose of preventing a recurrence of the fixation.

#### REPORTS OF CASES.

CASE I.—*Ankylosis of Right Temporo-Mandibular Articulation.* F. D., boy, *æt.* fifteen, admitted to Mercy Hospital, September 3rd, 1912, on account of absolute fixation and deformity of the lower jaw. The history given by the family stated that at the age of six months a swelling developed in front of the tragus of the patient's "left" ear. A few days afterward pus discharged from the external canal of the ear for four or five days, and then the swelling disappeared. There was no evidence of mastoid development, in fact there was no further trouble in that ear. The parents stated positively that there had been no throat or sinus trouble. After the ear trouble there was a progressive fixation of the jaw, which was complete at the end of one year. Since then he had been unable to open his mouth.

Upon examination it was found that the jaw was markedly deformed. The chin was narrow, pointed, receded, and was situated to the right of the median line (Figs. 9 and 10). The molars were found to articulate normally, but the upper front teeth projected beyond the lower about one-half an inch. The skin to the left of the symphysis menti was contracted, and this contraction extended into the tissues of the neck. There was no motion in the jaws. Note the marked flattening of the left side as shown in Fig. 9.

*Operation.*—From the history, the left side was the site of the infection, so it was concluded that that was the ankylosed side. The incision as described under the technique for this operation was made and the joint was exposed. There was no intra-articular ankylosis, but a capsular contraction, the result of a long fixation of the joint was present. The attachment of the tem-



poral muscle to the mandible was freed, but the jaw remained fixed. Through a second incision the masseter was freed with its attachment, as well as the internal pterygoid; still there was not a particle more motion in the jaw than before. A similar incision was made on the right side, and upon exposing the field, a bony ankylosis of the articulation extending forward on the tubercle of the zygoma was found. This was one solid mass of bone. This showed conclusively that the error had been made by the boy's parents in stating that it was the left side that had been involved in the middle ear infection. The findings showed that it must have been the right side. A new joint was made according to the technique described in this paper. On the morning of the next day the patient was able to open his mouth voluntarily far enough to introduce two fingers. The motion in his jaw was free, voluntary, and without pain. The range of motion increased rapidly by the use of the wooden wedge, and at the end of six months he could hold a large apple in his mouth (Figs. 11 and 12).

This operation was performed September 7th, 1912. The patient was advised to report to Dr. Murphy from time to time and to have a second operation for the removal of the deep scar tissue on the side of the neck. He did not return until December 13th, 1915, at which time it was found that the ankylosis had recurred.

He was re-operated on December 16th, 1915. The incision was made on the right side. After the neck was freed completely, the jaw could not be displaced downward. It was then believed that the fixation was on the left side, so an incision was made on that side, but no ankylosis was present. Returning to the right side, it was found that the tip of the coronoid process in place of being free and attached to the muscle, was attached to the base of the zygoma and ossified clear through to the under surface of the temporal bone. That was freed and a flap of fascia lata and fat from the thigh inserted.

The patient made an uneventful recovery, and when he left the hospital six weeks after the operation he had perfect motion in the jaw.

The reason for the recurrence was not found at the time of operation, as the patient gave no history of infection or trauma to cause a return of the ankylosis. After the operation was performed he was questioned again, and finally admitted having been kicked by a horse just previous to the return of the ankylosis.

CASE II.—C. D., girl, *æ*t. ten, admitted December 1st, 1912. The jaws were fixed so tightly that there was absolutely no motion. The history states that in September, 1909, the patient had contracted typhoid fever. During the three weeks of the disease she had complained of a sore mouth. The mother, upon examining the mouth, noticed a small, reddened, elevated patch about half the size of a pea on the buccal mucosa of the right cheek opposite the second or third lower molar. In several days this elevation had increased to about the size of a dime. The patient, who had been in the habit of putting her fingers in her mouth and working her teeth loose, had succeeded in pulling out the lower second and third molars. A yellowish discharge came from the raw surface. Subsequently the patient suffered from stiffness of the jaws of increasing degree, until at the end of the third week she was unable to open her mouth. There was considerable tenderness on pressure over the right temporo-mandibular articulation. The following week an incision was made over the temporo-mandibular articulation, the bone was scraped, and a drainage tube inserted. A yellowish fluid discharged for about two weeks, and after this had ceased the jaw became absolutely immobile. Three weeks later a red, painful swelling appeared on the jaw midway between the angle and the symphysis. The swelling was incised and its contents evacuated. A yellow fluid discharged for about a week, but ruptured spontaneously again

about nine days after the discharging sinus had closed. When the patient was seen she was unable to open her jaws even a fraction of an inch, but there was no pain nor was there any tenderness on pressure over the temporo-mandibular articulation (Fig. 13). The *x*-ray examination showed that there was not a bony ankylosis.

*Treatment.*—Patient was operated December 10th, 1912. In order to expose the field of operation freely, an incision was made extending from a point one inch in front of the ear on a line with the lower border of the external auditory canal downward to the angle of the mouth, describing a curve with its convexity downward toward the angle of the jaw. The jaw-bones were well exposed, and the original interpretation that this was not a bony ankylosis was confirmed. The remaining portion of the alveolar process both of the upper and lower jaws was removed. The attachment of the temporal muscle to the interior aspect of the ascending ramus of the inferior maxilla was divided. The jaw immediately dropped.

A tongue-shaped pedicle flap was then dissected free from the hard palate. The base of the flap was back of the mouth over the post-palatine foramen. The flap consisted of the mucosa, submucosa and periosteum. The inner limb of the incision being made about a quarter of an inch shorter than the outer limb, the base of the flap formed the base line of an obtuse angle, whose upright line was formed by an imaginary median line running through the center of the hard palate. Therefore, when this flap was turned outward so as to cover the denuded area in the upper jaw where the bone had been exposed by the chiseling, there was absolutely no contraction or interference with the circulation in the flap. The flap measured about an inch and a half in width and two inches and a half in length. Its sides were sutured to the free margins of the gums and the tip was anchored to the cheek. The mucous membrane of the cheek was then very carefully re-united and approximated with fine catgut.

The patient recovered promptly from the operation and was able to take liquid diet without any very great effort. A pledget of gauze folded on itself a number of times was placed between the jaws to act as a wedge. After a week the wedge-shaped piece of wood was substituted for the gauze pad. When the patient left the hospital four weeks after the operation, she could voluntarily separate her jaws for a distance of about an inch (Fig. 14).

CASE III.—E. W., man, *æ*t. twenty-eight, entered Mercy Hospital February 27th, 1913. The history showed that in July, 1909, he had an abscessed molar in the right upper jaw, for which he had no treatment until three weeks after the onset of the trouble, when a physician opened the abscess from within the mouth. A week later the whole right side of the face was swollen. An external incision was made through the cheek, but little pus was evacuated. Four days after this operation he was unable to separate the jaws to any considerable extent. Conditions became steadily worse, and in December, 1909, he was scarcely able to open his mouth at all. He said that something seemed to be holding his jaws together, but the mandibular articulations were never sore or swollen. He had no distinct chill at any time. In August, 1910, he had an operation performed within his mouth to relieve the ankylosis, but it proved a failure. Upon examination there was found to be a complete fixation of the jaw. We decided that it was one of the extreme extra-articular fibrous type, due to a cicatricial band which extended clear back to the ramus of the jaw.

The operation for the relief of this ankylosis was performed February 28th, 1913. The scar tissue was carefully divided, and in order to prevent its re-formation, two tongue-shaped flaps were interposed, one from the floor of the mouth and the other from the hard palate. Both flaps were tongue-shaped, about two and one-half inches in length and one-half and one inch in width,



respectively. The base of the flap was directed toward the alveolar process in the case of the upper flap and toward the root of the tongue in the case of the lower one. The tips of the flaps were sutured to the inner margin of the cheek. The denuded areas left after the removal of the flaps were left to heal over.

The result in this case was entirely satisfactory. The patient left the hospital five weeks after the operation was able to open his mouth voluntarily about one inch. This man was seen in December, 1915, and has a perfect result.

CASE IV.—A. D. C., man, *æt.* twenty-four, admitted April 9th, 1913. Eighteen years ago he was kicked by a horse on the left side of the jaw, and sustained a compound fracture just posterior to the mental angle. The wound suppurated for two months, when a sequestrum of bone or a tooth—he does not know which—was extruded from the wound, which then healed. Immediately after the accident the patient had a discharge from the right ear, which persisted for some time. He never had any pain in the ear before the discharge appeared or afterward. The fixation of the jaw took place subsequently to this ear discharge. In order that he might feed himself, the upper right canine and bicuspid were removed.

*Examination.*—The lower jaw was fixed and immovable. The left side of the face was slightly flattened from the angle of the jaw to the chin (Fig. 15). The right side was full and round. The chin deviated to the right of the median line and the skiagrams showed a considerable obliteration of the right temporo-mandibular articulation. There was a bony ankylosis extending forward on the tubercle of the zygoma.

*Operation.*—April 17th, 1913, the articulation was exposed, and after elevating the periosteum all anatomic landmarks were obliterated. An elevation that felt like the head of the mandible was visible, and there was a small amount of fibrous tissue resembling the capsule of the articulation. There was no motion in the joint. The usual arthroplasty was performed. The jaw moved freely after the operation. It was found that the opposite articulation was quite stiff, owing to a fibrous fixation, but nothing was done at this time. A week later the patient was again anesthetized and this fibrous fixation was overcome by forcibly opening the mouth. Success attended this effort.

*Result.*—The day following the operation the patient had free voluntary motion in the jaw, the range of which increased rapidly. When the patient left the hospital on the twenty-second day, he could open his mouth for a distance of an inch and one-half. A photograph made on September 12th, 1915, shows the excellent result (Fig. 16).

There are several interesting points in connection with this case which will bear emphasizing. He was kicked by a horse on the left side of his face and had a discharge from the right ear. He had no scar on the right side of his face. He evidently had a metastatic infection in the right temporo-mandibular articulation, and the abscess opened into the ear. He did not have an extension of the infection throughout the entire length of the chin, such as one encounters in mouth infection, typhoid infections, or phosphorus necrosis, in which the whole lower jaw from the symphysis menti up to the mandibular articulation may be involved so that the head of the bone becomes necrotic and is exfoliated.

CASE V.—*Fibrous Ankylosis of the Left Temporo-Mandibular Articulation.* W. B., boy, *æt.* six, admitted to Mercy Hospital, May 22nd, 1913, on account of an inability to open his mouth more than one-half an inch. The boy was an eight months' child, and it was early noticed that he had difficulty in nursing, but the reason for this was not discovered. At eighteen months the mother noticed that the right side of the face was flattened and deformed. The left side appeared to be full and round. About this time the boy had



pneumonia, and when the attending physician attempted to introduce a spoon into the mouth for the purpose of examining the throat, he was unable to do so. At the age of three the boy's mouth was pried open, and a cork placed between the teeth. However, when the cork was removed the jaw immediately closed down to one-half an inch. The patient was fed through a gap made in the upper and lower dentures by the extraction of a tooth in each.

*Examination.*—The physical deformity was striking. The left side of the face was full and round, while the right side was flattened over the body of the inferior maxilla. The mouth was slightly twisted and the chin was displaced to the left of the median line and receded. There was a slight antero-posterior sliding in the right temporo-maxillary articulation. There was no lateral motion whatever.

*Operation.*—May 23rd, 1913, the articulation was exposed in the usual way, and it was found that the coronoid process was free, but that there was a fibrous ankylosis between the head of the mandible and the fossa. This was removed, and about one-half inch of the head of the bone was amputated to make room for the interposing flap.

*Result.*—On the morning of the following day the boy had free motion in the jaw. The wound healed primarily. At the end of three weeks the patient could open his mouth a distance of an inch and a quarter (Fig. 18). Report received April 4th, 1914, reads as follows: "Result I am sure will please you, as it is a perfect one."

CASE VI.—D. C., boy, *æ*t. thirteen, admitted June 6th, 1913. In September, 1909, the patient fell from a third-story window a distance of forty-five feet, landing on a brick pavement. He alighted on his feet, but his knees were flexed forcibly and the body bent forward so that the chin was in contact with the knees. The result was two lacerations of the skin over the chin and several broken teeth. He was picked up unconscious, bleeding profusely from his nose, mouth and ears. He was unconscious for three hours and on the sixth day he was unable to open his mouth. His jaw was fixed and had remained so ever since.

Examination showed the right side of the face slightly flattened and the left side full and round. He was unable to separate his teeth at all, but because of the retraction of the skin, which was considerable, he was able to feed himself (Fig. 19).

June 7th, 1913, the patient was operated, and upon exposing the articulation a bony ankylosis extending from the condyle to the coronoid process was found. The usual arthroplasty with the interposition of the flap was done. The day following the operation the boy opened his mouth voluntarily for the first time in nearly four years. The range rapidly increased; and when the patient left the hospital two weeks after the operation, he opened his mouth freely about an inch and a quarter.

When the boy was seen again six months afterward, he had almost complete limitation of motion of the lower jaw, the result of neglect to carry out the prescribed after-treatment by means of the wooden interdental block.

A second operation was performed July 6th, 1914. There was some difficulty in obtaining sufficient fatty tissue for the interposing flap. The aponeurosis of the temporal muscle and what was left of the fascia and fat from the previous operation were utilized. There was a re-ankylosis in the joint, but none of the tip of the zygoma to the temporal bone. There was a large quantity of newly formed bony tissue, which had to be cut away before there was sufficient room for the interposition of the flap. The result at the present time may be seen in Fig. 20.

CASE VII.—*Bony Ankylosis of the Left Temporo-Mandibular Articulation.* F. C., boy, *æ*t. seven, admitted to Mercy Hospital, June 13th, 1913, because

of a complete fixation of the lower jaw. The boy was an orphan, so his early history could not be obtained.

Upon examination it was impossible to separate his teeth. Several teeth had been extracted in front of the boy's mouth to allow him to be fed. An attempt to pry the mouth open showed a slight forward sliding toward the left side. The left side of his face was full and round; the right side was flattened. The chin was slightly retracted, but the coaptation of the teeth was normal.

June 14th, 1913, the articulation was exposed, and it was found that there was an ankylosis of the bony type extending forward to the zygomatic tubercle. The dental burr, which is olive-shaped, and operated by an electric motor, was used in this case. The interposing flap was inserted in the usual way.

On the following morning the boy could open his mouth for half an inch. Motion was encouraged, and when the patient left the hospital on the sixteenth day he could open his mouth easily an inch and a quarter.

Eleven months after the operation the patient returned to the hospital with a complete fixation of the jaw. A second operation was performed May 18th, 1914, and it was found that a complete bony ankylosis had recurred and had extended forward beyond the maxillary tubercle toward the coronoid process. The usual operation was performed. It was found that all the previously interposed flap had entirely disappeared, probably due to the pressure on account of the failure to maintain the interdental block in the usual way.

The day following the operation the patient had no trouble on opening his mouth voluntarily for three-fourths of an inch. A photograph taken September 1st, 1915, shows the result (Fig. 21).

CASE VIII.—*Bony Ankylosis of the Left Temporo-Mandibular Articulation.* E. F., girl, *æt.* eight, was admitted to Mercy Hospital, July 10th, 1913, because of inability to open her mouth for more than one-fourth of an inch. At the age of two and one-half years she had had an abscess in front of the ear at the maxillary articulation. The patient could open her mouth at that time, and had no pain in moving the jaws. One week later pus began to discharge freely from the left ear, and the patient was very ill. Five weeks after the abscess had formed she was operated upon. The abscess in front of the ear and the one in the maxillary articulation were opened and drained. The wound in front of the ear continued to discharge pus for three months after the operation. A mastoid operation was also performed, and, on account of the continued discharge, four other operations were done, more bone being removed each time.

One week after the abscesses were opened the mother noticed that the baby could not open her mouth more than one-quarter of an inch. This fixation had remained in spite of repeated attempts at stretching. As was to be expected, there was little deformity in this case, excepting a slight flattening on the right side. The mouth could be opened about one-eighth of an inch (Fig. 22). The *x*-ray showed an entire obliteration of the temporo-mandibular articulation.

July 12th, 1913, the left temporo-mandibular articulation was exposed and the diagnosis of bony ankylosis was confirmed. After freeing the ankylosis and removing a sufficient quantity of bone, the typical interposing flap operation was done.

*Results.*—The morning following the operation the patient was able to separate the teeth for about one-half an inch. The wooden wedge was used as in all previous cases. Three days after the operation a hematoma formed under the skin flap. It was aspirated and did not re-form. After three weeks she could open her mouth for a distance of more than one inch. A photograph six months after the operation showed a perfect use of her jaws (Fig. 23).

CASE IX.—L. J., man, *æt.* thirty-one, admitted to Mercy Hospital, October

31st, 1913, with ankylosis of both hips, all the vertebral joints, the left temporo-mandibular articulation and a partial ankylosis of both shoulders. At the age of nineteen the patient fell from a horse, striking forcibly on the lower end of his spine. He had severe pain in his spine for several days. About nine months later, he experienced severe pain in his right hip, which increased in severity. There was no history of tonsillitis or other mouth, nose or sinus infection. He consulted a physician, who discovered a marked scoliosis in the lumbar region. A leather jacket was made which the patient wore for a period of four years. During this time the joints which were named above became ankylosed.

Upon examination the spine was found to be ankylosed from top to bottom. Both hips were stiff, and the lower jaw was absolutely fixed, so that he could not open his mouth at all. The conformation of his face indicated clearly that the left temporo-mandibular articulation was ankylosed. He had had several of his teeth extracted so that he could eat.

On November 10th, 1913, the usual arthroplasty for this condition was done, except that instead of an attempt being made to separate the ankylosis, the neck of the bone was divided; therefore a new joint was made by dividing the neck of the condyle, allowing all the head to remain in the fossa. The interposing flap was taken from the fat and fascia over the temporal muscle, and because of the sparsity of fat some of the muscle fibers were removed with the fat.

The wound healed by primary union in spite of a considerable hematoma which had formed, and which had to be aspirated repeatedly. The range of motion increased rapidly from one-half an inch the day following the operation to about three-fourths of an inch upon leaving the hospital. The range of motion in this case was necessarily limited by the impingement of the patient's chin against the chest. In spite of this, the patient could masticate freely.

CASE X.—M. Van W., girl, *æt.* eleven, admitted November 6th, 1913. When two and one-half years of age she had had a very severe illness lasting about six weeks. Her father stated that she had had a sore throat and expectorated a purulent material. When she recovered there was some stiffness of the jaws, which increased until four years ago, when the jaw became absolutely immobile.

Examination showed absolute ankylosis of the right temporo-mandibular articulation. The left side of the face was flattened. The right was full and round (Fig. 24).

November 15th, 1913, the usual operation was performed with interposition of the pedicled flap.

Following the operation, the range of motion increased rapidly, and when she left the hospital three weeks after the operation the spread of the jaws measured an inch and a quarter. A photograph received from this patient two years after operation showed a superlatively good result (Fig. 25).

CASE XI.—C. S., man, *æt.* twenty-five, admitted to hospital November 11th, 1913, because of ankylosis of the right temporo-mandibular joint and the right hip, with a discharging sinus over the right clavicle and another in the right groin. The history is one of acute metastatic infection following an exposure in 1905. The metastasis into the jaw took place about two years after the beginning of the trouble.

Examination showed a complete fixation of the jaw. The left side of the face was flattened. The chin was retracted and drawn slightly to the right of the mid-line (Fig. 26); therefore a diagnosis of bony ankylosis of the right temporo-mandibular articulation was made.

Although the patient came to the hospital with numerous lesions, what he



most desired was to be able to open his mouth so that he could feed himself. November 12th, 1913, the usual arthroplasty was performed.

At the time of the first dressing on the thirteenth day the patient could open the mouth nearly an inch, and when he left the hospital, three weeks after the operation, the spread of his mouth measured an inch and a quarter. The patient was again seen April 3rd, 1914, at which time he could easily open his mouth one and three-eighths inches without the slightest pain or discomfort (Fig. 27). Lateral motion of the jaw was perfect, and the scar was scarcely discernible.

CASE XII.—O. Y., man, *æ*t. twenty, admitted to Mercy Hospital, October 15th, 1914. He gave a history of having had typhoid fever (?) ten years ago. While in bed with typhoid fever the patient complained of severe pain in the region of his right ear for one day. The mother noticed that the child expectorated a thick yellow pus for the three days immediately following the onset of the pain. There was no discharge from the ear. Five months after the onset of the trouble, the parents noticed that the range of motion in the patient's mouth was gradually diminishing, and at the end of three months he was unable to separate his teeth at all.

Examination showed that he opened his mouth about the one-hundredth part of an inch, and that there was the very slightest motion toward the right side. There was a flattening on the left side, while the right side appeared quite normal (Fig. 28). Therefore a diagnosis of a right-sided ankylosis was made, and on October 17th, 1914, the operation was performed.

*Operation.*—Upon exposure of the joint it was found that the ankylosis was continuous from the tubercle of the zygoma on to the mandibular head and neck. There was a marked atrophy of the temporal muscles. Upon exposure it was found that the internal maxillary artery hugged very closely the neck of the mandible. In an effort to separate the posterior portion of the neck, the internal maxillary artery was torn. A new incision was then made over the bifurcation of the carotid, and the external carotid artery ligated. In this way the hemorrhage was completely controlled, and the operation was concluded in the usual way.

This patient made an uneventful recovery, and when he left the hospital, November 9th, 1914, he had a free and painless motion of his jaws. A photograph made August 25th, 1915, shows the extent to which the patient can now open his mouth (Fig. 29).

CASE XIII.—*Bony Ankylosis of the Right Temporo-Mandibular Articulation.* V. T., female, *æ*t. eighteen, entered Mercy Hospital, November 2nd, 1914. The history showed that when the patient was three years of age she was sliding down a balustrade in her play, and when she came to a turn, fell off, striking the left side of her chin and face on a coal-scuttle, about fifteen feet below. She had a severe laceration of the skin, which required a number of stitches. She did not lose consciousness. For two or three weeks she was unable to eat any solid food. About a year and a half later her mother noticed that the child did not open her mouth fully. For this condition she had been taken to a doctor, who advised forcible opening of the mouth each day. This had caused a great deal of pain, and undoubtedly considerable trauma to the tissues which held the jaws fixed. Gradually the fixation of the jaw became more pronounced, and the chin began to deviate to the right side. There was no history of middle-ear infection, nor of suppuration in the cheek following the trauma.

*Examination.*—From the history of this case one would expect rather a fibrous fixation than a bony ankylosis. The patient undoubtedly had a traumatic arthritis, with a subsequent limitation of motion, and finally a fixation of the jaw on the traumatized side (Fig. 30). The right side of the face was full and round, the left side being flattened and the chin somewhat retracted.

Operation was performed November 5th, 1914. The usual incision and exposure of the joint was made, and it was found that there was a considerable exostosis over the articulation on the outer side, which projected over to the inner side of the head and made the operation quite difficult. The internal maxillary artery was entirely in view for a considerable portion of the time, and was not injured. Great care was taken in displacing the parotid gland and facial nerve downward to avoid any injury to them. The usual interposing flap was made from the temporal fat and fascia.

The patient made an uneventful recovery, and was able to move her jaws freely before leaving the hospital (Fig. 31).

This case accentuates the harm that may be done by the acute trauma when attempting to force the jaws apart. If anything is to be done at all, the jaws should be blocked open, and the block permitted to remain for hours at a time. Each day this wedge may be pushed back a bit farther, giving just a fraction of an inch greater spread than was present the day before. In this way all severe trauma to the joint is avoided.

**CASE XIV.**—*Bony Ankylosis of the Left Temporo-Mandibular Articulation.* W. M., boy, *æt.* ten, admitted to Mercy Hospital, February 3rd, 1915. The history states that at the age of eighteen months the child developed an intestinal infection characterized by high temperature and frequent bowel movements. On the fourth day an abscess developed in front of the patient's left ear, and about the same time an infection of the right foot and left elbow occurred. The abscess in the region of the ear discharged pus for about three weeks. Following this he was quite weak, and was kept on a liquid diet up until the time he was two years of age. When the parents began to feed the patient solid food they noticed that he was unable to open his mouth sufficiently to permit of any mastication at all.

Examination showed some motion in the joint, and from this it was concluded that this was rather a fibrous than a complete bony ankylosis (Fig. 32).

The operation for the arthroplasty was performed February 6th, 1915. Upon exposing the articulation it was found that there was a bony ankylosis, which was undoubtedly the sequence of the abscess mentioned in the history. The ossification extended all the way across to the coronoid process. The usual aponeurotic flap was interposed.

This patient made an uneventful recovery, and has proved to be one of the most gratifying cases which we have had up to date (Fig. 33).

**CASE XV.**—*Double Bony Ankylosis of the Temporo-Mandibular Articulations.* E. S., man, *æt.* twenty-eight, entered Mercy Hospital, February 10th, 1915. The history states that when the patient was five years old he was kicked on the tip of the inferior maxillary bone by a mule. He does not remember about the subsequent symptoms. Thinks he was not unconscious, nor does he remember having been sick. A short time later the patient's mother discovered that the boy could not open his mouth fully, and he had some difficulty in mastication. He was taken to a doctor, who advised a spreading of the jaws by the use of wedges and corks. At the age of thirteen some type of operation was performed, without any relief of the fixation.

*Examination.*—The jaws moved about one-sixty-fourth of an inch. There did not seem to be the slightest sliding motion on either side. There was undoubtedly involvement of both mandibular joints (Fig. 34).

The first operation was performed February 13th, 1915. The right side was operated first. An exposure of the joint showed a bony ankylosis forward and on to the under surface of the zygoma. It was found that the neck of the mandible was about three-fourths of an inch thick. After considerable difficulty sufficient amount of bone was removed to permit of the usual flap

interposition. There was considerable bleeding, which subsided after five or six minutes of compression.

The left side was operated February 20th, 1915. Upon exposure of the joint it was found that an enormous mass of bone production had resulted from the previous operation when the boy was thirteen years old. A mass of bone one-half inch wide and extending across the entire neck was removed, and the usual flap of fascia and fat interposed.

This patient made an uneventful recovery without the formation of hematoma, and upon leaving the hospital was able to move his jaw freely to the extent of about an inch. Photographs received from this patient September 1st, 1915, show the condition before operation and also the amount of separation of the jaws after the operation (Figs. 34 and 35).

CASE XVI.—*Bony Ankylosis of the Left Temporo-Mandibular Articulation.* E. B., girl, *æt.* eight, admitted to the hospital May 19th, 1915. From the history it would seem that from birth this patient was unable to open the mouth fully. The child was born normally without the aid of forceps or instruments, and was the second child in the family. The parents state that there was no asymmetry in the child's face, but that as she grew older the inability to open her mouth completely became more noticeable. At the age of three the parents noticed that there was a slight asymmetry of the face. At this time she began to eat solid food by mashing it and pushing it between the teeth into her mouth with her fingers. The child was taken to a physician, who advised a forcible separation of the jaws under an anesthetic. Following this there was some improvement, but only for about a month. Immediately after, the patient noticed a marked sensitiveness in the articulations. Up to the present time there have been four unsuccessful attempts at spreading the jaws under an anesthetic. The last attempt was eight months ago. For the last six months there has been a noticeable decrease in the space of separation of the jaws, until at the time of operation the patient was able to open her mouth not more than a quarter of an inch.

Examination showed a marked recession of the chin with a deviation to the left side (Figs. 36 and 37). The flattening was on the right side. There was great protrusion of the upper teeth over the lower ones, and there was excessive muscular activity on the right side, all these things tending to show that it was a left-sided ankylosis. The mandibular head and neck are on the same level as the zygoma.

The patient was operated May 20th, 1915. After exposing the joint on the left side, it was found to be a bony ankylosis extending to the coronoid process. The neck of the mandible was about five-eighths of an inch thick, and it was removed in the usual way, and a large flap secured and interposed.

This patient made a very good recovery, and exceeded any of the previous cases in the rapidity with which the jaw was separated. A photograph taken two weeks after the operation shows a separation of one and one-quarter inches (Fig. 38).

CASE XVII.—*Bony Ankylosis of the Temporo-Mandibular Articulation.* C. S., male, *æt.* twenty-two, entered Mercy Hospital, May 19th, 1915. The history states that eleven years ago, when the patient was eleven years of age, he fell from a hay mound a distance of eighteen feet, striking upon his chin. He was not unconscious nor did he bleed from nose and ears. A physician was called, who examined the child's jaws and stated that there was a double dislocation backward. After some manipulation the physician was able to replace one side, but the boy's father believes that the other side was not reduced at the time. A plaster cast was applied with the mouth closed. A tooth was extracted to enable the patient to take liquid food (Fig. 39). After removing the cast at the end of ten days he experienced considerable pain on



opening and closing his mouth. The left articulation remained painful for a considerable length of time. The right-side articulation was not painful. He was able to separate his jaws only one-fourth of an inch.

*Examination.*—There was a pronounced deformity in the region of the left temporo-mandibular articulation. The mandibular head and the zygoma were elevated above the normal position. Whether it was the zygoma that had been driven up, or whether the neck had been displaced upward, was not easily determined by examination. There was a deviation, showing that there had been a fracture of the luxated portion of the mandible on the left side, with a pronounced depression.

This patient was operated May 22nd, 1915. Upon exposure of the joint it was found that the head of the mandible was fractured and dislocated, and that there was a firm bony union with the zygoma extending forward one and one-fourth inches. After considerable effort the neck was surrounded with the curved portion of the periosteotome, as is done in the typical operation. The segment of the neck was then chiseled away sufficiently to make ample room for the interposing flap.

This patient made an uneventful recovery. A photograph taken August 4th, 1915, shows the extent of separation two and one-half months after the operation (Fig. 40).

CASE XVIII.—*Fibrous Fixation Extra-Articular of the Right Side.* Mrs. C. F. M., æt. twenty-nine, was admitted to Mercy Hospital, June 7th, 1915. The history states that when the patient was sixteen months old she struck her head in the right temporal region against a chair. Two weeks later a swelling developed, persisted for many days, and then ruptured. After some time another swelling formed at the outer side of the right superciliary ridge. This was opened, and discharged for some time. Two months later the parents noticed that the patient had difficulty in moving her jaws. This limitation of motion became more marked, and at the age of nine was so great that a physician attempted a forcible separation. Following this manipulation there was some improvement for nine months, at the end of which time the jaws again became fixed, and they remained fixed in a position in which the patient had about one-fourth of an inch separation of the lateral incisors.

*Examination.*—The left side of the face was flattened (Fig. 41), and when she endeavored to open her mouth, it moved slightly to the right. A scar on the temporal zone extended well forward almost to the margin of the eye and upward to the temporal bone, showing that she had had an infection in her temporal fascia and that the ankylosis was due to the shortening of the temporo-coronoid fascia and muscle. The mandibular head may have to be removed. It is not a bony ankylosis.

This patient was operated June 8th, 1915. Upon exposing the articulation it was found that there was not a bony ankylosis, but the right temporo-zygomatic fossa was filled with scar tissue, which bound the coronoid process and did not permit of the separation of the jaws. The coronoid process was amputated and a flap interposed to prevent the reunion.

This patient made a rapid recovery, and a photograph taken on September 1st, 1915, shows the extent of the separation at that time (Fig. 42).

CASE XIX.—*Fibrous Fixation of the Left Temporo-Mandibular Articulation.* V. W., female, æt. seventeen, entered Mercy Hospital, June 20th, 1915. The history states that in 1908 the patient had typhoid fever during an epidemic. In the fourth week of the fever her mother noticed a very foul-smelling odor in the room. Several days later it was noticed that there was a small slough on the left side of the cheek, coming from within outward and extending into the skin. Four months later a plastic operation was performed for the closure of the opening in the skin which had been caused by the previous sloughing.

It was at this time, October, 1908, that the parents first noticed that there was a marked limitation of motion in the jaw. The range of motion gradually decreased, until the time of the examination the teeth could be separated less than one-eighth of an inch.

*Examination.*—There was a firm cicatricial mass, unyielding, and binding the mandible. There was no bony ankylosis of the mandibular head. It will be necessary to make an interposition of tissue from the mucous membrane of the soft palate.

*Operation.*—The patient was operated on June 21st, 1915. It was found that all the work had to be done from the inside of the mouth. There was great difficulty in freeing the jaw, and a small area of necrosis was found on the surface of the mandible. Scar tissue had developed on the bone for such a long period that there had developed a sort of coronoid process anterior to where it should be. The surface of the mandible and this new-formed coronoid process were taken off. This permitted of free motion of the jaw. A flap was then taken from the palate and the side of the tongue to cover in the denuded area, and to prevent a re-formation of the cicatricial band which had fixed the jaw. At the completion of the operation a wedge one and one-quarter inches thick could be placed between the teeth on the affected side.

*Results.*—This patient has a perfectly movable jaw, and can masticate food without pain or discomfort.

CASE XX.—*Bony Ankylosis of the Left Temporo-Mandibular Articulation.* A. W., girl, *æt.* eleven, entered Mercy Hospital, September 23rd, 1915. The history states that at the age of three the patient had typhoid fever, and was confined to her bed for a period of three months. During the fourth week of the fever there developed a swelling in the superior maxilla on the left side above the canine. The patient was delirious and was continuously picking at her teeth, and finally extracted the canine and bicuspid teeth on the left side. Following this there was a sloughing of the soft parts in that area, and a number of pieces of bone discharged. After three weeks the entire area was completely healed. About a year later, when the dentist attempted to extract some teeth, he was unable to have the patient open her mouth sufficiently to get a good exposure of the tooth he wished to extract. About three years ago the mother noticed that the child could not open her mouth for more than one-half inch. Gradually this distance decreased, and in 1912, when this patient was first examined, she was unable to open her mouth at all.

On September 23rd, 1915, when the patient presented herself for operation, there was just the slightest motion in the jaws, possibly one-hundredth of an inch, to the left (Fig. 43). The flattening was on the right side. There was practically no flattening on the left side. There was no palpable cicatricial contraction, so it was evidently an infection of the mandibular articulation. The measurements made at the time of examination were as follow: The distance from the mid-line of the chin to the tubercle of the zygoma measures four and one-half inches on the left side and five inches on the right side.

*Operation.*—The patient was operated September 25th, 1915. It was found upon exposing the joint that the ankylosis was of the bony type, and extended all the way forward to the coronoid process. In order to get a better exposure of the ankylosed portion a small portion of the lower half of the zygoma was removed. On account of the extent of the ankylosis it was impossible to insert the tip of the periosteotome anteriorly, as is customary in these operations. It was possible to insert the periosteotome only posterior to the mandibular neck and all the bone was removed from behind forward. After a sufficient amount of bone had been cut away the internal maxillary artery could be seen pulsating in the field. The usual interposing flap was placed into position. At the completion of the operation it was possible to spread the jaws

sufficiently to insert the wedge on the affected side. The result ten days after the operation is shown in Fig. 44.

CASE XXI.—*Double Ankylosis of the Temporo-Mandibular Articulation.* D. J. W., male, *æt.* twenty-three, came to the office for examination September 7th, 1915. The history states that the patient was struck at the point of the jaw when he was six years of age. The traumatic arthritis which followed resulted in a bony ankylosis of both articulations.

Examination showed a markedly receded chin. There was a scar on the left side of the face, but this side seemed to be more perfect than the other. It was impossible to say positively which side was involved, but it looked like a double ankylosis. The zygoma on each side seemed to pass out over the head of the mandible. The left side will be operated first. The patient never returned for operation.

CASE XXII.—*Bony Ankylosis of the Left Temporo-Mandibular Articulation.* M. L. H., male, *æt.* twenty-two, came to the office for examination September 9th, 1915. The history states that at the age of three the patient fell a distance of fourteen feet, striking on the point of his chin. The impact was sufficiently great to knock out three of his front teeth. After this he was unable to open his mouth more than one-half inch.

*Examination.*—The right side of the face was found to be flattened and the left side appeared to be normal. When he attempted to open his mouth the motion was very slightly toward the left side (Fig. 45). This motion was only about one-hundredth of an inch. The distance from the angle of the jaw to the lower margin of the zygomatic arch measured two and three-fourths inches on the right side and two and one-half inches on the left side. From the examination it would seem that the left side only was ankylosed.

*Operation.*—The patient was operated October 16th, 1915. It was found upon exposing the joint that the ankylosis was of a bony type, extending from the head of the mandible to the base of the zygoma and clear across the entire sigmoid notch and forward beneath the coronoid process, fixing it to the temporal bone (Fig. 8). A considerable portion of the coronoid process had to be removed in order to free it from its bony fixation. The interposing flap was inserted in the regular way.

Fig. 46 shows photograph taken four weeks after the operation, showing the result which the patient already had. The motion was absolutely free, voluntary and painless. This patient was examined by me on October 2nd, 1916, and I found a still greater degree of separation than is shown in Fig. 46. The motion is very free.

CASE XXIII.—*Bony Ankylosis of the Right Temporo-Mandibular Articulation.* H. V., boy, *æt.* fourteen, came to the hospital November 2nd, 1915. The history states that at the age of seven he fell a distance of twenty feet striking the tip of his jaw. No physician was consulted at the time, because the parents did not believe that the injury was a serious one. Aside from some slight difficulty in mastication for several days, the patient had no other trouble. About six months later the parents noticed that the boy could not masticate his food as well as had been his custom previous to the injury. In the six months which followed there was a gradually progressive limitation of motion, until at the end of one year after the accident the jaw was completely fixed.

*Examination.*—There was a marked prominence of the zygoma on the left side, which side was found to be markedly flattened. The motion, which was very slight, was toward the right side.

*Operation.*—The patient was operated November 4th, 1915. After the joint was fully exposed, it was found that at the time of the accident the head of the mandible had been split, and that half of it slid up on the outer side of the zygoma, and the other half slid down and ankylosed, so that it was easily



three-fourths of an inch thick and fully an inch in width where it spread over the zygoma. In doing the operation it was impossible to get the anterior periosteotome in position, so all the work had to be done with the posterior periosteotome in position. The bone was divided from behind forward and all the bony surface removed. The interposing flap was then inserted in the regular way.

The morning after the operation the motion in the jaw was free and voluntary. Fig. 46 taken two weeks after the operation, shows the extent of motion which the patient already has. He was permitted to go home two weeks after the operation with instructions to continue the use of the wooden wedge. No report has been received from him since he went home.

This patient had quite a good-sized hematoma under the flap. The hematoma was aspirated on alternate days for about one week. When the patient left the hospital the wound was perfectly healed, and the stitches had all been removed.

#### OPERATIVE COMPLICATIONS.

Murphy often spoke of the several elements of danger connected with the work on the jaws. First and foremost among these is the injury to the internal maxillary artery, the location of which must always be borne in mind in the removal of the head and neck of the mandible, as it hugs the neck on the inner side very closely, and can easily be injured. If it is injured, the external carotid artery should be ligated opposite the cornu of the hyoid bone, where it is most accessible and readily reached. In one of our cases it was necessary to resort to this procedure. In another case the external carotid was ligated as a preoperative precautionary measure.

The second element of danger is realized on consideration of the facial nerve. This nerve leaves the skull through the stylo-mastoid foramen, passes forward across the lower portion of the parotid, where it is distributed to all the muscles of expression of the face. If this nerve is injured there is danger of inducing permanent paralysis, particularly of those fibers that pass to the temporal and supra-orbital zones. These can all be avoided by the L-shaped incision made just above the zygomatic level. The third element of danger lies in the fact that one is almost certain to penetrate the base of the skull if he endeavors to divide the ankylosis in the line of the original articulation. Therefore it was Dr. Murphy's method always to remove the condyle of the inferior maxilla, and not to attempt to clean out the glenoid fossa.

#### POST-OPERATIVE TREATMENT.

The after-treatment is very important. Mastication should be started at the end of two weeks to avoid the formation of too much fibrous tissue between the ends of the divided bone. The wooden wedge (Fig. 2-E) should be placed between the molars on the operated side and kept there day and night for at least two weeks to prevent a possible compression necrosis of the interposing flap.

If a hematoma forms under the flap, this must be aspirated repeatedly until all oozing has ceased.

In conclusion it may be stated that Murphy frequently said that in all arthroplastic work there is no operation that gives the same satisfaction to the patient as that for ankylosis of the temporo-mandibular articulation; also there is no arthroplastic operation which is so free from danger of every kind. There is no other operation than the interposition of the fascia and fat flap that gives satisfactory results, and no other has been brought forward that should be performed unless there are other complicating conditions which prevent the resection of the neck of the mandible. It is such a clean-cut, positive procedure from the technical standpoint and gives such uniformly good results from the clinical standpoint, that it seems to us that no other operation so far devised should be done in this class of cases.

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## THE ANATOMY OF PROLAPSE OF THE UTERUS WITH A CONSIDERATION OF THE MECHANICAL PRIN- CIPLES OF ITS REPAIR.

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Operations for prolapse of the uterus are numerous. Different procedures have been used for the relief of this condition with equal success, and the same procedure in different hands or in the same hands has met with varying success. In search for an explanation for this fact the writer instituted this inquiry, as a result of which he believes that it is only by a full understanding of the anatomical conditions present in prolapse that these failures can be explained and avoided. As a result of his study he believes that nearly all these operative procedures when properly performed are of more or less value, and the best of these operations done without a proper appreciation of its anatomical basis is certain to result in failure.

The most popular operations for prolapse are tabulated in the following column. These do not comprise all the operations which have been devised for prolapse. The writer has purposely excluded many which seem to have no rational anatomical basis, or which are but slight variations of typical operations included in this grouping.

### 1. Simple Plastic Operations.

- (a) Amputation of cervix.
- (b) Anterior colporrhaphy.
- (c) Perineorrhaphy (Emmet, Hegar, Holden, Watson).

### 2. Interposition Operations (Schauta, Wertheim, Watkins).

### 3. Operations on the Pelvic Fascia.

#### Vaginal Route.

- (a) Plication of cardinal ligaments (Alexandroff, Dudley, Nyulasy).
- (b) Vaginal Hysterectomy with suture of pelvic fascia (Mayo, Truesdale).

#### Abdominal Route.

- (a) Plication of pelvic fascia (Polk).



## 4. Suspensions From Above.

- (a) By fundus uteri (Olshausen, Kelly).
- (b) By round ligaments (Gilliam, Simpson-Noble, Webster-Baldy, Mayo).
- (c) By broad ligaments (Coffey).
- (d) Hysterectomy and suspension of cervical stump.
- (e) Inclusion of fundus in abdominal wall (Kocher, Murphy).
- (f) Hysterectomy and suspension of pelvic fascia to sheath of rectus abdominis (Fletcher).
- (g) Vagino-fixation (Mackenrodt).

## 5. Suspension of Cervix.

- (a) Shortening of utero-sacrals.
- (b) Plication of pelvic fascia in pouch of Douglas (Moschowitz, Jones).
- (c) By tendon of *psoas parvus* (Harris).

To understand the principles upon which all plastic and restorative operations upon the pelvic supports must be based, it is necessary to review the anatomy of the pelvic muscles and fasciæ. As has been shown by numerous writers<sup>1</sup> the pelvis is closed in below by two distinct planes (Fig. 1). The superior or fascial plane is formed by the strong pelvic fascia, which, continuous above with the transversalis, iliac, and lumbar fasciæ and lightly attached to the brim of the pelvis, sweeps downward and inward to unite with the fascia of the opposite side to form the anterior vaginal wall, the anterior and lateral ligaments of the bladder, and to be

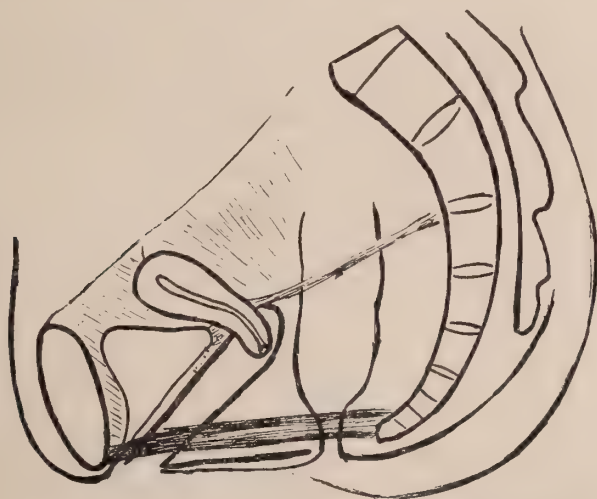


Fig. 1.—Showing the pelvic and perineal fascia and levator ani in sagittal section.

inserted into the cervix uteri at about the level of the internal os. At its lateral insertion into the cervix it is reinforced by a somewhat fan-shaped band of fibres in which runs the uterine artery. This reinforcement of the fascia forms the so-called cardinal ligament, or Mackenrodt's ligament.

Posterior to the cardinal ligament, which is located at the point of attachment to the pelvic fascia or base of the broad ligament, the fascia is thinner and dips more deeply into the pelvis, forming a rather firm insertion into the rectum.

From the under surface of the fascia is given off a layer which passes behind and helps to form the posterior wall of the vagina. This layer covers the superior surface of the levator ani, being continuous around its inner border with a prolongation from the anal fascia, thus forming a complete sheath for the muscle.

The inferior, or musculo-fascial, plane, or pelvic floor is formed by the levator ani muscles, with the fasciæ covering them, the small muscles of the pelvic outlet, and the perineal fascia. The pelvic fascia as it sweeps downward and inward from the pelvic brim gives off inferiorly the obturator fascia. This line of division forms the so-called 'white line' which extends from the posterior surface of the os pubis in front to the spine of the ischium behind.

The levator ani muscle is divided into two parts. The posterior, or obturator coccygeus, arises from the inferior surface of the white line and is inserted into the sides of the coccyx. It is with the anterior, or pubo-coccygeus, that we are more intimately concerned. The pubo-coccygeus arises from the posterior surface of the os pubis and passes backward on either side of the vagina to be inserted into the tip of the coccyx and the fasciæ of the pelvic outlet, many of the fibres being inserted into a median raphe behind the rectum. There is much discussion as to whether any fibres of the levator pass to the median line in front of the rectum. Studiford<sup>2</sup> and others deny the presence of any fibres in the perineum. However, the connection of the levator with the fasciæ of the perineum is so intimate that in injury which caused separation of the fibres of the levator from the fascia would have the same result as a rupture of the fibres themselves. The fascial sheath of the levator is formed by the posterior vaginal layer of the pelvic fascia above and the anal fascia beneath, the two being continuous about the inner border of the muscle.

The small muscles of the perineum, the sphincter vaginæ, and transversus perinei, are of small size and little importance. In fact it is very difficult to demonstrate them in a multiparous subject. Of much greater importance is the perineal fascia, analogous to the triangular ligament in the male. This firm fascia stretched between the ischiopubic rami forms the external portion of the perineum. It unites at the fourchette with the fascia forming the

posterior vaginal wall. The perineal body consists of the fibrous tissue between these fasciæ, but the fasciæ themselves are the essential and important part of the perineum.

The bladder and uterus are supported on and by the superior fascial plane. The posterior vaginal and anterior rectal wall are supported by the pelvic floor or inferior musculo-fascial plane. Proof of this lies in the fact that prolapse and procidentia not infrequently occur without perineal tear, and the occurrence of severe perineal tears without prolapse or procidentia; that perineorrhaphy alone, no matter how anatomically successful, will never cure procidentia.

Furthermore the mechanism of procidentia must be studied (Fig. 2). As the superior fascial supports give way especially at the reinforcement where the fascia joins the cervix, the cervix drops

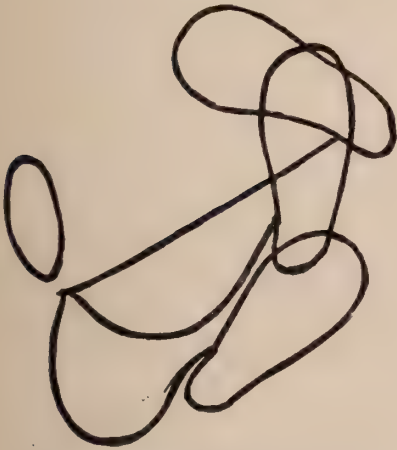


Fig. 2.—Showing the mechanism of prolapse of the uterus.

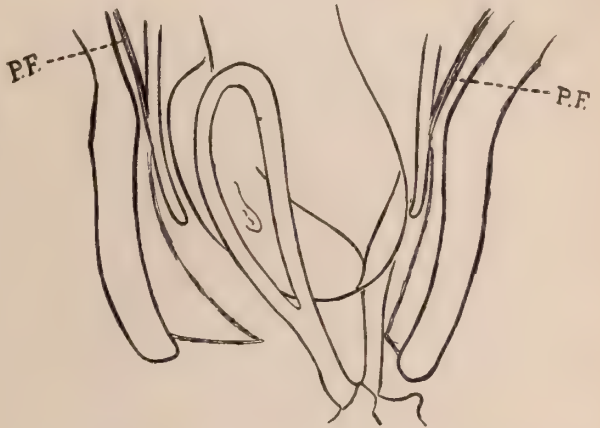


Fig. 3.—P. F., pelvic fascia. Showing how forceps operations stretch out the pelvic fascia.

from its posterior position in the pelvis downward and forward, and the anterior vaginal wall also rolls out at the same time forming a cystocele. As the process continues the cystocele increases and the cervix drops lower, the fundus becoming secondarily retroverted. In the final stage the anterior vaginal wall appears outside the vulva, followed by the cervix, and last by the upper part of the posterior vaginal wall.

The round ligaments and the utero-sacral ligaments act chiefly as guy ropes, the former holding the fundus forward and the latter the cervix back. The broad ligaments proper serve only as a mesentery for the uterus.

Prolapse of the uterus is generally found in one of two classes of patients.

I. Those in whom a single high forceps delivery, necessarily



done before complete relaxation of the pelvic supports during labor, has resulted in a rupture of numerous small filaments of the pelvic fascia (Fig. 3).

II. Multiparous women in whom because of too rapidly recurring pregnancies, or because of failure to secure proper involution after delivery the fascial supports have gradually stretched out.

#### OPERATIONS FOR PROCIDENTIA.

*Simple Plastics.*—It seems fairly obvious that simple plastics alone will not cure procidentia, although in nearly all the procedures to be described they form an important part. It is not the writer's intention to describe each operation in detail, but to point out the essential anatomical principles of each.

The old-fashioned cystocele operation depends for its success upon a sufficiently wide denudation to allow the sutures to pick up strong fascia upon the sides. Where this fascia is weak the operation is predestined to failure, no matter how skilfully performed. Even the additional support of fixation above will not guarantee success in such a case.

All operations for the repair of prolapse should include a perineorrhaphy. It has been argued that the union of the levators is not an anatomical procedure if the fibres do not normally unite in front of the rectum, but this does not contraindicate this procedure any more than transplantation of the cord in the Bassini operation for hernia is contraindicated because the cord is removed from its natural bed. On the other hand, union of the levators seems essential to securing the best perineal support.

*Interposition Operations.*<sup>3</sup>—The anatomical principles of the interposition operations consist in a resection of the fascia of the anterior vaginal wall, the displacement of the bladder upward and the inversion of the fundus forward (Fig. 4). The fundus is securely anchored to the strong fascial base near the pubic ramus, and the upward displacement of the cervix puts the remaining part of the fascia upon the stretch. Success in this operation must depend upon a fairly firm uterus which will maintain the fascia upon the stretch without sagging.

*Operations Upon the Pelvic Fascia.*—The truly anatomical operations consist in the plication of the fascia. Alexandroff,<sup>4</sup> Dudley,<sup>5</sup> and Nyulasy<sup>6</sup> plicate the cardinal ligaments. Alexandroff sutured the cardinal ligaments together in front of the cervix (Fig. 5). Dudley detached them from the uterus and united them to each other in front of the cervix. Nyulasy, of Australia, plicates each cardinal ligament, suturing it separately to the anterior wall of the uterus. The danger of all these is that the uterine artery and vein run in that part of the fascia which forms the cardinal ligament and are very easily perforated with the needle which has given

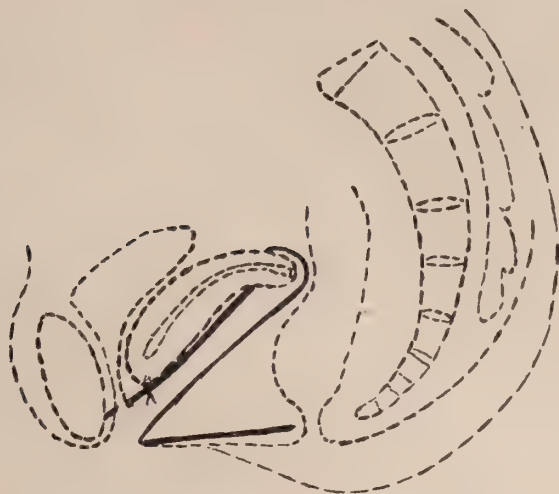


Fig. 4.—Interposition Operation (Watkins).

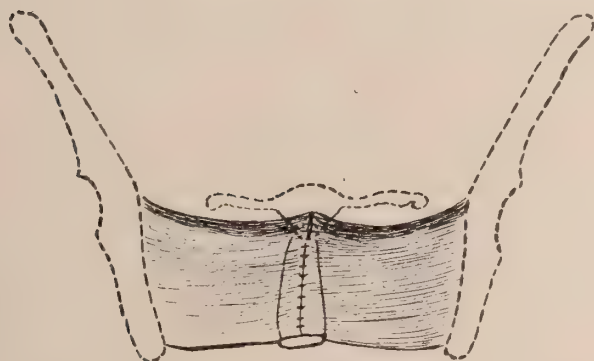


Fig. 5.—Union of cardinal ligaments in front of cervix (Dudley).

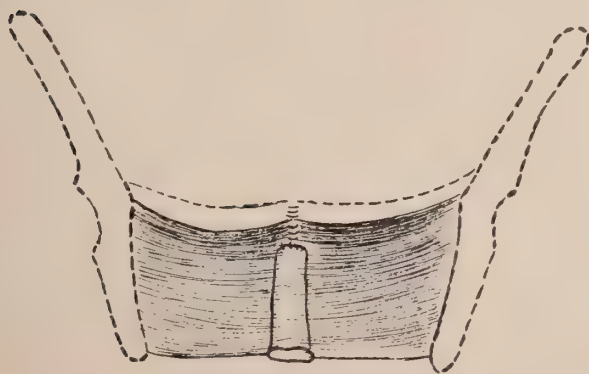


Fig. 6.—Mayo's operation. Vaginal hysterectomy with union of broad and cardinal ligaments. Broad ligaments in outline.

rise to fatal secondary hemorrhage. Goffe<sup>7</sup> modifies the operation by suturing the bladder to the anterior face of the uterus, before uniting the cardinal ligaments.

Mayo<sup>8</sup> does a vaginal hysterectomy and unites the pelvic fascia from side to side (Fig. 6). Truesdale<sup>9</sup> turns out the uterus as for an interposition operation, but then amputates the fundus and unites the broad and cardinal ligaments from side to side, inverted.

Polk's<sup>10</sup> is the most strictly anatomical operation. He separates the bladder from the uterus from above through a median abdominal incision, and then plicates the fascial plane forming the anterior vaginal wall. This operation has had comparatively little trial and its practical merits are as yet uncertain.

*Suspension From Above.*—Suspension of the fundus depends for its action on putting the pelvic fascia sufficiently on the stretch

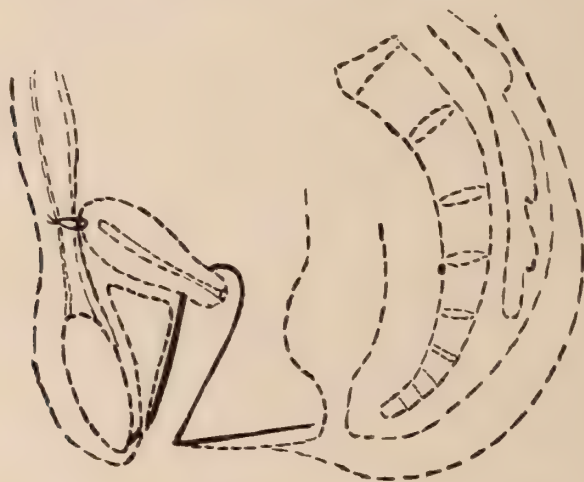


Fig. 7.—Ventral fixation. Showing how the fascia is put upon the stretch by raising the uterus out of the pelvis.

by drawing it upward, to hold up the anterior vaginal wall and bladder (Fig. 7). This procedure should be preceded by plastic operation on the fascia from below. Hysterectomy and suspension of the cervical stump gives a firmer suspension of the fascia. Round ligament suspensions are as a rule inadequate to meet the strain of holding up the uterus and bladder together. Harris,<sup>11</sup> Kocher,<sup>12</sup> and Murphy<sup>13</sup> have even incorporated the uterus in the abdominal wall in order to secure a firmer fixation. Harris sutured the fascia to the under surface of the fascia. Kocher brought the fundus out through the fascia and sutured it to the anterior surface of the fascia. Murphy in addition bisected the uterus and removed the endometrium, suturing the two halves separately to the fascia.

Vagino-fixation is mentioned only to condemn as having no ana-



tomical basis. It simply sews the fundus to the already prolapsed pelvic fascia.

*Shortening the Utero-sacral Ligaments.*—The object of this procedure is to resist the downward and forward displacement of the cervix. It does not, however, take into account the true support of the uterus, the pelvic fascia, and throws a strain upon the utero-sacrals, which from their small size and lightness, it is evident that they were never intended to bear. Somers<sup>14</sup> modifies the interposition operation by detaching the utero-sacrals from their cervical insertion and reuniting them in front of the cervix.

Moschowitz<sup>15</sup> and later Jones<sup>16</sup> have advocated plicating the pelvic fascia behind the uterus, obliterating the cul-de-sac of Douglas. This procedure is anatomically correct if the fascia is picked up and not merely peritoneum. It deserves a trial from its sound anatomical basis, but only use can determine whether it is technically possible in many cases.

Harris<sup>17</sup> conceived the idea of using the tendon of the psoas parvus to hold the cervix in its normal altitude in the pelvis. The tendon is divided and its distal segment sutured to the posterior wall of the cervix. Should the psoas parvus be absent part of the psoas magnus may be used.

#### CONCLUSIONS.

1. Prolapse of the uterus is the result of stretching of its strong fascial supports.
2. Procidentia is most common in women who have had a high forceps delivery or in multiparous women with frequent labors in whom the fascia has not involuted properly.
3. The mechanism of prolapse is as follows. As the fascial layer gives way the anterior wall of the vagina prolapses, and the cervix simultaneously drops downward and forward. The uterus becomes secondarily retroverted. Finally the whole anterior vaginal wall followed by the cervix and lastly the upper part of the posterior vaginal wall appears outside the vulva.
4. The anatomical principle of successful repair by any operation is that it must restore the pelvic fascia to its normal tension. It is usually impossible to restore the integrity of the fascia, but so long as it can be held under sufficient tension to support the bladder the operation will be functionally successful.
5. All operations for prolapse should be completed by restoration of the pelvic floor, since this usually needs repair also, not with the idea that perineorrhaphy will support a prolapsed uterus.

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VALUE OF BLOOD-PRESSURE OBSERVATIONS MADE  
DURING SURGICAL PROCEDURES.

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If one draws a conclusion from much that he hears and observes in the larger clinics, relative to this subject, he is very liable to be misled. Of all the subjects brought to the attention of the profession, none has been more loosely studied, or more indifferently interpreted. In fact, the technique used in making the observations is usually quite faulty and the interpretations of readings thus made, very questionable. To obtain an intelligent interpretation, it is, of course, quite necessary not only to understand the best technique for securing the different pressures, but one must thoroughly understand the significance of each and every pressure, as well as the etiological factors influencing them.

*Technique.*—After many years' experience we find the auscultatory method much superior to the palpatory method. By having long rubber tubes running from the stethoscope disc, which is held constantly over the brachial artery by means of an elastic band, to the ear pieces, and a large reading dial placed so as to be readily observed, my anesthetist can make frequent observations without difficulty, in fact, without moving from his position. Sufficient air is forced into the arm band to cause complete cessation of the circulation in the artery. The air is then very carefully released and the first distinct pulse-wave heard is registered as the systolic pressure. Further air is released, and the last distinct pulse-wave heard is noted as the diastolic pressure. We have found this quite practical for a working basis, and it avoids the confusion which might follow a discussion of the different phases of sounds.

## DEFINITIONS OF THE DIFFERENT PRESSURES WE USE.

*Diastolic Pressure.*—This may be defined as the pressure existing in the artery under observation during the diastolic pause just preceding the succeeding cardiac systole. Taken alone it is the truest index of the arterial tension. No matter what the systolic pressure may be, if the diastolic is high, there is a true hypertension of the vessels; and conversely, if the diastolic is low, we are dealing with hypotension, and this is true irrespective of the systolic pressure.

*Pulse Pressure.*—This is defined as the force used necessary to move the column of blood in the artery. It represents the force exerted by the contracting ventricles in excess of the diastolic pressure.



*Systolic Pressure.*—This is the sum total of pressures existing in the artery under observation during cardiac systole. In other words, it represents the diastolic pressure plus the pulse pressure, and shows the energy being expended by the myocardium at a given moment. It is, therefore, very variable, depending much upon requirements and the ability of the heart muscle to meet these requirements. It varies even from psychical disturbances, being influenced by many emotions such as anger and fear. Physical exertion or stress may also affect it markedly. From this great susceptibility to variations, one easily concludes that taken alone it is not nearly so important as the diastolic. However, when compared with the other pressures it is invaluable, as it clearly shows one the endeavor that the heart is making to maintain circulatory equilibrium.

*The Pressure-Ratio.*—So far as I know, Stone was the first to introduce this term, which seems to me to be more expressive than any yet offered. Briefly stated, I mean by pressure-ratio, the percentage obtained by dividing the pulse pressure by the diastolic pressure. Take the systolic and diastolic pressure and then find their difference, which will be the pulse pressure. You then have simply the following problem: "What percentage is the pulse pressure of the diastolic pressure?"

For example, let us assume that a normal case has a systolic pressure of 120 m.m. and a diastolic of 80 m.m. The pulse pressure is the difference between these two which is 40, and the ratio of pulse pressure to diastolic is  $40/80$  or  $1/2$ , which means 50 per cent. of the diastolic pressure. We have found in our experience that this pressure-ratio is really the *sine qua non* of the whole matter, as it expresses "the relationship existing between the kinetic energy expended by the cardiac contraction in moving the blood column, and the potential energy stored in the arterial walls and column of blood which they contain" (Stone).

Our experience also leads us to believe that the ratio may be normal between the limits 40 and 60 per cent. If your case has vascular contraction and rigidity as shown by a high diastolic pressure, but has a compensating heart that is pushing the blood to the periphery as shown by a corresponding rise in the systolic so that the pulse pressure remains near the 50 per cent. ratio to the diastolic, you need have no fear in proceeding with a needed surgical operation. If, however, the pressure-ratio is low, say 20 per cent., and taking into consideration the probable presence of acidosis or other toxemia, it is wise to offer a grave prognosis. On the other hand, if the pressure-ratio is greater than 80 per cent., the prognosis is at least equally grave, as one may look for little cardiac reserve force because of overwork already done so that slight shock becomes very grave.

By having the convenient arrangement which I have above de-

scribed, it is quite easy for my anesthetist to make more or less constant observations which is quite important.

By using this 'barometer' we are able to forecast the approaching storm long before it can be determined by any other method, and thus get our boat to shelter. Everyone knows how notoriously inefficient is the treatment of shock when once profoundly established, and if anything is to be done it must be recognized and the proper course instituted before the heart is exhausted by rapid contractions in its attempt to hold up the blood-pressures. "Unvariable pressures during operations are the result of most painstaking technique on the part of the surgeon, anesthetist, and everyone concerned in carrying out a shock-free technique. Such results cannot be obtained by accident, but it is necessary to eliminate certain procedures peculiar to the individual surgeon and anesthetist, which by means of proper blood-pressure readings are found to be frequently productive of more or less disastrous results either at the time, or during the few days succeeding the operation. For example, no surgeon is willing to admit that he is rough in the belly, and no anesthetist rushes into print with the admission that he generally overdoses his patients, but a series of cases where the blood-pressures are frequently taken in each case, will commend or condemn their technique most emphatically. If circulatory depression frequently occurs even in minor degree, it is due to faulty technique, and the cause should be discovered and removed; it may necessitate an entirely new technique in several particulars" (McKesson).

Having made observations and records of the pressures in 98 per cent. of our cases for the past eight years, we have, as a result of our experience alone, come to certain conclusions which I wish to offer at this time.

1. The systolic pressure alone is of very slight, if any value.
2. The diastolic pressure alone is of much more value than the systolic alone.
3. The pressure-ratio is the essential factor, and offers the earliest danger signal.
4. There are certain elements in technique which have a marked and constant effect upon the pressures. These are as follow:—
  - (a) The psychical or emotional state of the patient.
  - (b) The position of the patient upon the table, the extreme Trendelenberg being the worst.
  - (c) Overdosing by the anesthetist.
  - (d) The amount of traumatism inflicted by the actual operation, such as cutting and tearing the tissues with scissors, the hands, and other dull instruments; the packing of large gauze packs instead of rubber tissue into the abdominal cavity.
  - (e) The preservation of the fluids in the body up to the hour of operation, this being absolutely necessary to maintain the usual pressures.

## DUODENAL ULCER WITH ACHLORHYDRIA.

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By E. L. CRISPIN, M. D., of Rochester, Minn.,  
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In duodenal ulcer the total and free acids are usually high. The free acid frequently has a higher relative proportion than normal. Subnormal acidities are occasionally recorded. In gall-bladder disease subacidity and achlorhydria are quite common. When the clinical history is not distinctive of either lesion, and particularly when there are no direct roentgen findings, the gastric analysis is used to influence the weight of evidence in making the diagnosis. Gastric analysis showing an achlorhydria with the usual test breakfast technique should not too strongly prejudice against a diagnosis of duodenal ulcer, if the evidence given by the patient indicates ulcer.

The following is a brief review of the history of 11 cases in the Mayo Clinic of operatively proved duodenal ulcer in which the gastric analysis showed an absence of free hydrochloric acid.\*

The analyses were made by the routine technique used in the Clinic. Patients sent for gastric analysis are instructed to eat an evening meal of bread, meat, potatoes, etc., to be followed later by about twenty raw raisins. In the morning they are given a test breakfast consisting of 30 gm. of arrowroot biscuit and 400 c.cm. of water. The water is served in two portions, one warm and the other cold. The test breakfast is withdrawn after from fifty to sixty minutes and any remnants of the evening meal are noted. The gastric content is filtered and titrated with phenolphthalein and dimethylamidoazobenzol. When the amount of free hydrochloric acid is below 20 Gunzberg's test is done. This is delicate to .005 per cent. for free hydrochloric acid. The Rehfuess acidity curves and short-time motor meals are not done as part of the routine examination.

Ten of the eleven patients in this series were males. The one female, aged thirty-seven, was the youngest. The oldest patient was sixty-six. The average age was fifty-four years. Four of the patients had used alcohol moderately, *i. e.*, 1 on a basis of 0 to 4. Seven had been moderate users of tobacco. In no case was there history or evidence of syphilis. In all there was weight-loss, the greatest being 94 lb., the least 5 lb., and the average, not counting the very excessive loss of 94 lb. in one case, 15 lb.

It is interesting to note that as regards previous illnesses, four of the patients (36 per cent.) had had typhoid fever on an average

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\*This number is less than 1 per cent. of the total number of duodenal ulcers demonstrated at operation.



of twenty-four years before. Three of the patients had had abdominal operations; in two the appendix had been removed eight and six years before, respectively; the third patient had been operated on for gallstones four years before; stones were not found; the gall-bladder was drained and the appendix removed.

The average duration of gastric history in these cases was 6.9 years. The duration of attacks when the patients presented themselves for examination had varied from three weeks to five months. In three instances there was complaint of continuous trouble for a year or more; in nine there was a history of spells and free periods. The appetite was variable, being given by different patients as poor, fair, and good. In only one case was a cause ascribed for the attack; in this it was attributed to chill or cold.

All the patients had pain or distress. In two instances it was located in the stomach, in five in the epigastrium, in one in the left epigastrium, in one in the right epigastrium, and in two in the epigastrium and right costal margin and through to the back. The intensity varied from a dull aching to a burning, gnawing pain lasting until food was taken. The time of pain or distress was variable, beginning from one-half to four hours after meals. Night pains were recorded in three instances. The methods used to control distress were given as food taking in 8 cases, alkali in 6, gastric lavage in 2, and morphine in 1. The type of pain indicated perforation in one case. Nine patients gave a history of vomiting, varying in character from hot sour water to delayed vomit. Two patients had hematemesis. Nine complained of gas, belching and bloating. Eight were constipated; three had had diarrhea; and three reported blood from the bowel.

In none of these cases was free hydrochloric acid found in the gastric content. The lowest acidity was 4-0-4, the highest 38-0-38; and the average 15-0-15. Food remnants from the evening meal were withdrawn with the test breakfast content in 6 of the cases. The largest amount of retention was 1,200 c.cm.

Ulcer was diagnosed clinically in 6 cases; ulcer or cancer, with a question mark, in 2; cancer of the pylorus in 1; and cancer of the stomach in 1. One case was marked 'for exploration.' Gall-bladder disease was recorded in the clinical diagnosis in 3 cases and carcinoma of the pancreas in 1. Disease of the appendix was recorded as a part of the diagnosis in one instance. The roentgen examination, made in 10 of these cases, was correct in 5, indeterminate in 2, negative in 1, and in error in 2.

In operating on these cases of duodenal ulcer, it was found that 1 was associated with empyema of the gall-bladder; 2 had perforated; in 3 there were also gastric ulcers (in two instances on the posterior wall, and in one on the lesser curvature). In 5 cases there was no disease in the upper abdomen other than the duodenal ulcers. In 6 of the cases marked obstruction of the duodenum was found at operation. In 1 there were two ulcers on the anterior surface of the duodenum. In 5 of the 11 cases the appendix was removed at the time of operation. Because of the ulcers a gastro-enterostomy was done in all.

## ANGIONEUROTIC EDEMA AS A CAUSE OF ABDOMINAL PAIN.

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A few weeks ago I was asked by Dr. W. G. Stearns, of Chicago, to see a woman on account of pain in the upper abdomen which had been assumed to originate in the gall-bladder. She was a woman of about forty-five, had been doing the work of a laundress for some years, but apart from attacks of pain, similar to that which caused her to be sent to me, had been well.

Physical examination showed a fairly well-nourished woman, no tender areas in the abdomen, chest negative, teeth fair, and the throat showed chronically hypertrophied tonsils. There was a relaxed perineum, but the pelvis was normal.

As the history of the pains she had had did not definitely suggest any specific abdominal lesion and as nothing could be made out upon physical examination, she was sent into the Medical Division of the Evanston Hospital, service of Dr. W. G. Alexander, for observation. Under his supervision, she had test meals, barium meals and fluoroscopic examination of the stomach and intestines, barium enema, examination of the feces and, in short, all of the usual methods of arriving at a diagnosis. Also at this time a careful and searching history was elicited.

All these procedures were barren of results so far as giving a definite cause for her pain. Nothing could be found either by means of the fluoroscope or in any of the plates which were made which suggested a gall-bladder lesion, ulcer of stomach or duodenum, or appendicitis. Test meals, blood-counts and all other forms of laboratory investigation were equally negative. She had, however, while in the medical ward, three attacks of abdominal pain, the pain being in different parts of the abdomen at each attack, and none of the attacks coinciding with the usual characteristics of any specific abdominal lesion. She also during this time had two attacks of angioneurotic edema, the swelling in each instance being of short duration. On one occasion the edematous area was upon the back, and on another it was the face which was affected.

The fact that the pains, as described in the history elicited, and as observed in the ward, did not conform to the usual surgical types; as physical examination and laboratory and x-ray investigation were negative; as the woman was of a somewhat neurotic type; as the attacks of pain, though seemingly severe while they lasted,

rapidly disappeared; and particularly because of the fact that attacks of angioneurotic edema were observed, a diagnosis was made of visceral crises due to angioneurotic edema, and she was advised not to undergo laparotomy.

Her relaxed perineum, from which she had some real discomfort, was repaired by the writer and the infected tonsils removed by Dr. Will Walter of the laryngological service. She was advised to undergo tonsillectomy because it was supposed that there might be some relationship between the tonsils as foci of infection and her attacks of edema. Rosenow has proved the possibility of experimentally causing erythema nodosum, and that the streptococcus is the causative agent. The tonsils, furthermore, were the only definite and demonstrable focus of infection which could be discovered.

The external appearances of this disease have been known since Quincke's description of it in 1882, at which time it was known by his name. Earlier descriptions had appeared, that by Graves in 1848 probably being the first. Upon the subject of the erythemas and urticarias and other exudative skin lesions there exists a rather abundant literature which it will not be attempted to review here.

It is only recently that attention has been drawn to the fact that visceral occurrences of exudative phenomena, similar to those observed upon the visible surfaces of the body, may give rise to abdominal pain which may cause even experienced observers to open the abdomen in the belief that some acute surgical pathology exists. W. J. Mayo, as indicated in the recent report from the Mayo clinic, has on three occasions upon opening the abdomen, found localized exudative changes. On closing the wound without doing anything, the patients all recovered rapidly.

In cases in which abdominal pain is complained of, which recurs and does not conform to any true surgical type, it would seem that the possibility of this form of lesion should be considered, particularly if the individual be at all of the neurotic type and painstaking physical examination fails to show any sufficient cause for the pain. A careful history should be taken, and the previous occurrence of localized swelling on the skin should be closely inquired into.

In the case described above one might easily be led into believing that the woman suffered from gall-bladder disease. A failure to recognize the true state of affairs, or perhaps one might more fairly say, a failure to recognize that the condition is not really a surgical one, may lead to operative intervention from which the patient may receive no benefit. A certain diagnosis of this condition is apt to be made only after observation and careful anamnesis.

It is at least of great value to know that such cases are to be encountered and that as a rule a differentiation from other lesions is possible. If a case be met with in which such a condition be suspected, and the patient's general condition be better than would seem proportionate to the severity of the apparent surgical lesion, the best surgery may be a masterly inactivity.



## ON THE CO-ORDINATION OF THE TWO ENDS OF THE SMALL GUT. ITS SIGNIFICANCE IN GASTRO-INTESTINAL SURGERY.\*

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It is quite generally admitted that ileac delay is associated with dilatation of the duodenum. Ileac delay is commonly due to some form of incomplete terminal ileac obstruction. In other words, incomplete obstruction is often associated clinically with dilatation of the duodenum. Experimentally,<sup>1</sup> it has been shown that partial occlusion of the distal end of the ileum is followed by increased duodenal dilatability. The significance of this relationship lies in the suggestive diagnostic value of enlarged duodenums.<sup>2</sup> If a roentgenogram records a duodenum of increased size, one might infer, on the basis of the above considerations, that the distal part of the small gut is involved in adhesions or otherwise obstructed so as to interfere with its emptying power.

The writers on 'intestinal stasis' have drawn attention to the causative significance of the ileocecal region upon dilatation of the duodenum.<sup>3</sup> Ochsner<sup>4</sup> begins with the inflammation of the appendix which, he says, reflexly closes the ileocecal sphincter, causes delay in the end-ileum, and contracts the 'duodenal sphincter,' and checks the normal progress of the food in the proximal 10 cm. of the duodenum. Lane<sup>5</sup> emphasizes the obstruction of the ileum by 'kinks' or by bands which mechanically retard the contents in the aboral ileum, cause the overfilled ileum to 'drag' on the duodeno-jejunal flexure, and in this way to produce 'stasis' and dilatation of the cephalad duodenum. Many *normal* appendices have undoubtedly been removed and their removal has relieved the patients' symptoms. It may be that an anatomically normal appendix may (possibly biochemically) close the ileocecal 'valve'; it seems more probable that the appendix, once the source of an active inflammation, has, in the healing process, so interfered with the normal relations of the ileocecum as virtually to effect an incomplete obstruction in the caudad ileum, and that the severing of such an appendix relieves these restraining bands. Furthermore, it must not be forgotten that the ganglionic relations of Auerbach's plexus are particularly rich in the duodenal loop and about the termination of the ileum in the cecocolon, the so-called 'loculus rotundus.'<sup>6</sup>

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\*From the Laboratory of Experimental Surgery, New York University.

With this in mind, it seems quite probable that stimuli arising in the terminal ganglia are transmitted to the proximal duodenal nerve cells and that this interchange is manifested by changes in the neuromuscular tone of the two ends of the small gut. Either an appendicitis or a fatigued end-ileum might, conceivably, furnish such stimuli.

When the delay in the terminal ileum is so marked as to amount to a complete tie-up of the ileac contents, the duodenal tone, during the first five days at least, increases. The same duodenum might, therefore, appear dilated at one examination and contracted at another. On the basis of such reasoning, a hypotonic or a hypertonic duodenum suggests a possible impairment of the end of the small intestine.

TABLE SHOWING THE INCREASE IN DUODENAL TONE FOLLOWING COMPLETE ILEAC OBSTRUCTION IN CATS.

ANIMAL NO.	DAYS OF OBSTRUCTION	DILATABILITY OF THE DUODENUM		
		Before	and	After
336	3	3.5 c.cm.		1.66 c.cm.
337	3	2.5 c.cm.		2.0 c.cm.
327	5	21.5 c.cm.		7.0 c.cm.
329	4	3.33 c.cm.		2.0 c.cm.
330	4	3.8 c.cm.		1.75 c.cm.
331	4	3.0 c.cm.		2.87 c.cm.
335	3	8.0 c.cm.		1.9 c.cm.

Such an arrangement between the ends of a neuromuscular tube is not unique. Analogies are found in the two ends of the large intestine and between the two extremities of the ureter.

The difficulties in utilizing the above data in everyday practice are the comparative infrequency with which the duodenum is photographed in serial *x*-ray studies of the gastro-intestinal tract and the possibility of an abnormally large or small duodenal shadow being the index of a duodenum that is large or small as the result of some other disease process in the body. In the presence of other evidence of ileac delay, an atypical duodenal picture should increase the likelihood of terminal ileac obstruction.

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## THE ETIOLOGY OF CERTAIN CONDITIONS SIMULATING INJURY.

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By FRANK WARNER, M. D., F. A. C. S., of Columbus, Ohio.

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In making medico-legal examinations, I have frequently found, from time to time, patients coming to me with certain appearances of having sustained an injury, when in fact the real etiology of the symptoms were due to some other cause. I am only speaking now of patients who are acting in good faith in ascribing their symptoms to some supposed injury, when in fact the real cause of the trouble was entirely outside of it. Under these circumstances, patients frequently ask for damages from the corporation by whom they have sustained these alleged injuries. It is extremely important that all patients suffering from an obscure trouble, the supposed result of an injury, be examined with the most painstaking care that no injustice be done either to the patient or the corporation.

Malingers must be watched for at all times; but many patients suffering with some disorder, truly and honestly believe that their trouble is the result of an injury, when as a matter of fact the injury had absolutely nothing to do with the disablement.

How often patients come to the surgeon with a hernia that they allege was the result of some specific strain, naming the place and exact time of its occurrence. It may be possible for herniæ to occur in this manner, but time and again I have operated on these and found a sac that was thickened beyond any possibility of its recent occurrence. It is likely that all herniæ have some etiological cause dating far back of the actual occurrence of the trouble. Whether this is a faulty attachment of the muscles in this region, or the presence of a peritoneal pouch along the cord, in the case of inguinal herniæ, or other cause, is not the purpose of this paper to discuss here. Suffice it to say, that the public have been too ready to conclude that every rupture was the direct cause of some strain which the patient had undergone. And perhaps the profession of medicine as a whole has not attempted to correct this false impression.

Yet, in all fairness both to patient and corporation, it must be remembered that herniæ occur along lines of abdominal incisions following some sudden strain. But there is a weakness there that permits this. Perhaps the fascia has pulled apart slightly after the operation, or the muscles may not have healed after the in-



cision so as to give their usual support. It has seemed to me that in some of the cases where herniæ have followed operations, considerable connective-tissue had formed in the line of incision; that this connective-tissue had subsequently undergone stretching, thus weakening the structures to an extent that permitted a hernia to form when there was some unusual strain put upon the parts. Murphy\* speaks of the manner of the occurrence of some of these herniæ in abdominal incisions: "After a sudden exertion, the patient felt a sharp pain in the lower right quadrant of the abdomen, and noticed two bulgings—one on the right at the site of an appendicitis celiotomy-scar, and the second on the left, in the inguinal region. Although an abdominal support had been worn, yet the celiotomy-hernia gradually increased in size."

In most of the herniæ of the inguinal type that I have observed, it has seemed that the internal oblique and transversalis have not had their attachments occurring as far internal on Poupart's ligament as is ordinarily the case. This makes a great weakness in this region. When an unusual strain occurs, it seems only logical that a hernia would occur, just as one occurs along a line of incision, weakened in the way just spoken of.

All cases of herniæ require a differential diagnosis from varicocele and hydrocele at least; occasionally from other troubles. But I have frequently had patients consult me for a supposed hernia resulting from a strain, when as a matter of fact a careful examination revealed the presence of a varicocele, or more frequently of a hydrocele.

Illustrating a group of cases which is not infrequently encountered, the result of one of the specific infections, was a patient who, some time ago, came to me, or rather was referred to me by a corporation for examination for an alleged injury to a testicle. This injury was supposed to have been due to a very unusual strain. Damages were demanded, and I believe demanded in good faith. An attorney was employed, who in turn secured a number of professional men to examine the patient. The verdict of all was that gonorrhea was the usual cause of a swelled testicle, but that in addition to this more usual cause, as well as others, it might occur from injury sustained from some severe lifting and sudden strain of releasing suddenly a great weight. There was no history of gonorrhea, and certainly none present that could be detected by the most approved laboratory methods. Milking of the seminal vesicles and prostate gave a mucus free from gonococci. The urine was centrifuged, but no specific germs were found. A Wassermann test was negative. But lastly and finally, the complement fixation test for gonorrhea gave a positive finding. This

\*The Clinics, June, 1916, p. 466.

means, according to Kolmer, as stated in his work on "Bacteriology," that a positive complement fixation test for gonorrhea means living germs somewhere within the human system. A little later, the testicle gave such trouble that his own surgeon deemed it advisable to remove it, when its true gonorrheal character was divulged. This gonorrheal infection had undoubtedly been acquired years before, the germs had lain dormant for all this time, when they suddenly burst forth to do their injury. Of course, no damages were secured. But it is not always easy to prove that a certain disablement is not the result of an injury, even though you are morally certain in your own mind that it had absolutely nothing to do with the case. The law always puts the burden of proof on the corporation to show that the trouble did not come from the injury. This is not always easy to do in some of the cases admitting of a less positive demonstration than the one above.

Another case of interest was an alleged injury of the back. Two months before the examination that was made by me, the patient was struck in the back in the lumbar region, by the handle of a truck. He worked a few days after this occurred. Then he noticed a weakness of a general type. Some aching appeared in the legs, also some weakness developed in these members. He consulted a physician who discovered he was carrying a slight temperature. An attorney was employed who sought damages for his client for this alleged injury. A careful examination revealed the fact that no demonstrable injury was present. The x-ray showed an absence of any bone or joint disturbance. The nerves and cord presented no lesion as demonstrated by the usual tests. There was no deviation of measurements of the circumference of the thighs or legs, nor alteration of sensation or motion, nor Romberg sign or Babinski. Tendon reflexes were normal, pupils centrally located, responding readily to light, kidneys normal, Wassermann test negative, abdomen normal, heart normal, except too rapid, 100, temperature, one degree of elevation.

The examination of the lungs showed the real seat of the trouble. Tuberculosis was demonstrated. Dullness on percussion of both lungs along the inner border of each scapula, and diminution of vesicular murmur in both these regions. X-ray examination showed clearly and unmistakably the presence of tubercles in these situations.

Of course, this settled the case so far as the medico-legal features were concerned. The man unquestionably acted in good faith in believing that the slight blow he had received in the back was in some way concerned in the development of the symptoms which appeared at the same time, simply a coincidence. I am sure that anything but a most painstaking examination would have failed to reveal the true trouble which existed.

The next case well illustrates the fact that symptoms arising subsequent to the injury may be entirely independent of it in their causation. A man forty years of age received a blow in the abdomen from a stick of wood. Soreness remained a number of days following the accident, which necessitated his ceasing work and remaining in the house. Within a few weeks, soreness again appeared in the abdomen associated with cramp-like pains similar to the ones he had following the accident. Neither the pain nor soreness was localized; simply general in character. These pains reappeared periodically for the following two years, when he came into my hands. Slightly obstructive symptoms had appeared, which made one feel that adhesions about the intestines were responsible for the trouble. At operation I found a chronic appendicitis with adhesive bands about the head of the colon, and one band that bound down the ileum, which accounted for the obstructive symptoms. As the blow had been received in the upper part of the abdomen and the adhesions were in the appendical region associated with a well-defined, chronic appendicitis, the inference was that the original injury had promptly subsided without serious effects and that the appendical trouble had come in as a coincidence to accentuate the importance of the effects of the injury.

Occasionally the surgeon will encounter a patient with neurosis that is ascribed to a traumatic cause. These are always difficult cases to diagnose and assign to their real etiology. But by very careful work in the examination, one may find a real demonstrable pathology which clearly accounts for the neurotic disturbance, and this may be far removed from any traumatic etiology.

Oppenheim\* refers to the occurrence of symptoms in supposed cases of traumatic neuroses, which are in reality due to other pathological conditions capable of demonstration by careful interrogation and examination of the patient. In discussing the neuroses of a traumatic type, he says: "The previous description refers to the severer types of the traumatic neuroses. Many cases occur, however, and they are constantly increasing, in which only subjective troubles exist, complaints of pain, loss of strength, etc., or there is only a slight number of subjective phenomena, the examination being negative. These cases are not nervous patients at all, but are suffering from some hidden surgical disease, as, for instance, Freund showed in a number of cases, and as x-ray examinations frequently demonstrate. A great number of the cases of true simulation belong also in this category."

Struempell\*\* says: "In the great majority of cases it is not at all difficult to recognize positively the 'traumatic neuroses.' The existence of gross material injuries can, as a rule, be easily ex-

\*Diseases of the Nervous System, p. 740.

\*\*Textbook of Medicine, p. 658.



cluded. It may be harder to decide whether there is real disease or simulation."

Even in real cases of traumatic neuroses one may feel that a patient is simulating some of the trouble from his constant tendency to exaggerate his symptoms. But this must not be assumed as simulation, because it is well known that it is very common for neurotic patients to make statements that are exaggerations of the real conditions found.

These cases take on a symptom-complex that partakes of the character of a psychosis and a neurosis. The patient dwells on his unfortunate condition. He feels that recovery is unlikely. Headache, tinnitus aurium, vertigo and general weakness are frequent symptoms associated with the disease. Local pains over the seat of the injury are frequently complained of. If about the back, limitation of motion of both back and occipital regions are frequent symptoms. Sometimes, slight exertion serves to bring up the heart's action to a rapid gait. Often insomnia is present. The patient is dull and disinclined to expend physical or mental energy, for he feels he has neither to give. His whole condition is often expressed in his general appearance of mental and physical exhaustion.

On examination the motor power may be found diminished. Motor exhaustion after exertion is very common. In addition to these points, an examination must include the many little details involved in an examination of the nervous system. When this is done, one may conclude that the trouble is one of a truly traumatic type of neurosis. On the other hand, in some cases, one will be rewarded for his pains by discovering that the symptoms that have arisen subsequent to an injury did not take their origin in conditions associated with the injury, but were in reality due to some demonstrable pathology that was in existence either before the injury, or arose subsequently as a complication, but without reference to anything associated with the injury.

In one of my cases of alleged traumatic neurosis, in which headache, nausea, vertigo and rapid heart action were prominent features, associated with lack of nutrition and general weakness, it was found that a general arteriosclerosis was the basis of the trouble, and that it had been in existence before the injury was sustained.

It is always a more difficult matter to make a satisfactory examination and intelligent diagnosis of a patient who is looking for possible damages, for one can never feel as certain of the statements of the history of the case. The patient may be honest, but there is always the possibility of bias to his own interests warping a true perspective of his own case. A single examination may be quite insufficient to determine the true cause of the disease, but by repeated and careful examinations, one will be able to show that either the symptoms are dependent upon some other disease, or that they are really and truly due to the effects of the injury, as stated by the patient.

FIRST AID SYSTEM.

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Chief Surgeon, Chicago Elevated Railroads.

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The subject of first aid to the injured has received a great amount of publicity during the past two years, mainly in connection with the Red Cross Society and the National Preparedness movement, while the same work in industrial, transportation and manufacturing life has been neglected.

The purpose of this paper is to give in brief an outline of a First Aid System that is adaptable to any company employing a small or large number of employes, who from the nature of their work are liable to meet with accidents.

First aid like preparedness has its advocates and its opponents in the medical profession. Some of the prejudice against first aid by the layman is caused by the poor, inefficient and careless manner in which this work has been done in the past.

There are many cases on record, no doubt, where through bungling and incompetent first aid services more or less harm was done to the injured patient; but first aid work properly arranged and maintained in a systematic manner is a boon to mankind and is the means of saving life and minimizing pain to an injured person in time of accident.

Where first aid work has met with failure in the past and been frowned upon by medical men, was due to lack of proper system in organizing, equipping and instructing the layman in the fundamental principles of this important work.

The author is personally acquainted with certain facts, that in one or two instances corporations have furnished elaborate first aid equipments to their employes and neglected to instruct them in the use of same, with the result that the injured employe was afraid to use the equipment and in many cases, where it was used improperly, great harm was done.

No employer would think of placing some delicate piece of machinery for use in his shop without carefully instructing the employe how to use it. Without instruction in any new work there is bound to be failure through ignorance of the principles of same.

In organizing a first aid system that will be efficient, the essential factor is to secure a suitable first aid cabinet and have it supplied with those supplies necessary to give intelligent treatment to the injuries that arise in that particular shop or department.

From a long study and experience in this line of surgical work, the author has devised a cabinet that is applicable to shop, railroad, school and home first aid.

The type adopted is a wooden cabinet, 24x12x8 inches, so constructed as to open like a suitcase. The shelving is so arranged that the supplies fit in snugly and are not thrown about when the cabinet is carried. Metal clips are provided to hold the bottles in place.

This cabinet is hung on the walls of the shop, car or home, and when needed for use inside or at a distance it can be taken down and carried by means of the handle on the top.

Simplicity in construction with avoidance of fancy trimmings, glass doors, etc., provides a sanitary cabinet and one to be had at small cost.

The contents recommended below are sufficient to care for a large number of injuries and are all that is necessary to treat any injury that may arise. The surgeon in charge of this work can add to this equipment as he sees fit, in order to meet with the requirements of his particular work.

When material has been used out of the cabinet it should be replaced at once with new, so as to have a complete kit at time of accident, as described below:—

- 4 1-oz. boxes sterile cotton, for reinforcing burn dressings.
- 6 2-inch sterile gauze bandages, for tying splints, dressing burns, etc.
- 6 2-inch sterile gauze bandages, for wound dressings.
- 12 1-inch sterile gauze bandages, for finger injuries.
- 12 Glassine envelopes containing six layers of gauze, 3x3 inches, to be used in contact with wounds.
- 1 Pair scissors (blunt points).
- 1 Medicine dropper (glass).
- 1 Bar germicidal soap, for cleansing hands of operator.
- 1 2-oz. tube of sterile petrolatum for burns.
- 1 Roll zinc oxide adhesive, 5 yards x 1 inch.
- 1 Bottle containing 24 sterile cotton wrapped applicators, for applying iodine to wounds and for removing foreign bodies from the eye.
- 2 Clean towels for placing about the injured part and for use as slings.
- 1 Piece of heavy linen tape, 1 inch x 1 yard long, for use as a tourniquet in connection with a lead pencil.
- 2 oz. boracic acid (water solution) for use in eye cases.
- 2 oz. aromatic spirits ammonia, for stimulation.
- 2 oz. tincture iodine in a rubber corked bottle. This bottle to have different shape from the other bottles. Great care must be exercised in instructing the layman in the proper use of iodine.
- 1 Card for receiving patient's name, nature of injury and treatment given.
- 1 Non-technical first aid booklet which is in accordance with the instructing surgeon's methods.
- 1 Printed set of rules on first aid attached to the cabinet.

The above material in the judgment of the author is all that is necessary for intelligent first aid work.



The mistakes most often encountered with the usual first aid outfit, as supplied through the trade, is that they contain too great a supply of material and are too complicated for the average layman.

With the cabinet a United States Army stretcher and blanket are recommended. There is a folding stretcher on the market that is very convenient in carrying, by reason of its compact nature.

#### INSTRUCTION.

The surgeon in charge of this work should select only those employes who from past record and observation seem best fitted to be entrusted with this important work. Personal instruction should be given by the surgeon either by lectures or demonstrations to individual and to small group classes of employes. The surgeon should avoid in his lectures all medical technical words and illustrate his talk with practical demonstrations. Each employe should be obliged to practise the various first aid measures until he is thoroughly acquainted with each.

Personal instruction should be given the employe in assisting in dressing injuries in the medical department, as this will instill in them confidence and a sense of responsibility.

These lectures and instructions should be given at frequent intervals so as not to allow the employe to become deficient in his first aid work.

Systematic inspection and reporting to the surgeon on the condition of the first aid outfits should be made weekly.

#### CONCLUSION.

The Chicago Elevated Railroads have 128 first aid stations with a complete first aid outfit at each station. These stations are located at all yards, shops, power houses, terminals, etc.

During the past three years 4,300 men received treatment for various injuries by the men in charge of these stations, without one case of questionable harm being done the patient. The end-results of this system are derived from the facts that there has not been a death in three years from wound infection. There have been no deformities or cases needing hospital treatment for wound infections, and the number of simple infections has decreased 85 per cent.

In closing, there remains one fact and that is, first aid work must be under the supervision of a surgeon and not left to the layman to work out for himself.

## SPECIAL ARTICLE.

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### "LITTLE CLASSICS" PHYSICIANS MAY HAVE OVERLOOKED.

[It is the custom nowadays to ridicule everything that is mid-Victorian: morals, clothes, furniture and books. That we have advanced on the right lines since the days when the thought of the English-speaking world was dominated by middle-class ideas that made our furniture as unattractive as our morals, cannot be denied; and he who would want to go back to the period when no latitude was allowed our manner of thinking, when literature moved lumberly along a rut, when to be scientific was a dedication of the soul to the devil, would indeed be a reactionary whose act would merit the condemnation of all thinking people. But though the mid-Victorian period was synonymous with all that is hateful to us now, it yet had some bright and startling luminaries: Tennyson, Browning, Carlyle, George Eliot, Dickens, Thackeray and Darwin at the same time when one of its outstanding features was horsehair furniture and antimacassars. And it had some lesser lights who would be well worth mentioning and who even to-day would receive some notice from our most modern and untrammelled critics, though the charge might be made and sustained that their writings are a bit old-fashioned, that their sentiments are a bit saccharine, and that their outlook is as hampered as was the waist by the ridiculous coats affected by the man of fashion in the 'sixties and early 'seventies. To the 'lesser lights' belongs Lord Avebury (Sir John Lubbock), whose essay on "The Body" we are printing this month.

Sir John Lubbock—we prefer to call him by this name since his other name, Lord Avebury, is not so well known to men of science and to those who have followed Victorian literature—was born in 1834 and died in 1913. His span of life, therefore, was long, but it is not on account of its length that we would pause, but on account of its variety, for he was banker, parliamentarian, man of science, and litterateur. And though he was not a great financier in the sense that the Rothschilds and the Barings were, and not a great parliamentarian in the class with Gladstone and John Bright, and not a man of science the equal of his best friend, Charles Darwin, and not an essayist of the calibre of Charles Lamb or Thomas De Quincey, he was nevertheless a man of so many parts, of such thorough and painstaking performances, of so deep an interest in the intellectual progress of the English people in the last century that he becomes an outstanding figure in the social history of that period. It may be true that our Shaws, our Chestertons, our Filson Youngs and our Hilaire Bellocs do not bother their heads or tax their readers' patience with essays on "Kindness," on "Adversity," on "Contentment," but it is also true that the modern essayist in shirking these subjects leaves a decided gap in his writings. And it may be true that 'quiet writing' is a thing of the past and cannot possibly enlist the modern reader's attention even for a short time. But granting all this, let us for a moment turn to one whose philosophy was calm, whose outlook brought content, whose thoughts were never turbulent but dwelt continually in stilled waters, whose manner of writing is old-fashioned, and realize if possible that perhaps there are some redeeming virtues in the literary product that is not all bombast and brilliance.—LITERARY EDITOR.]

## THE BODY.\*

The feeding of the five thousand with the loaves and fishes was a miracle in the sense of being against the ordinary course of nature, but the ordinary course of nature is itself marvelous. The way in which man is fed by the multiplication of grain, the increase of flocks and herds; the way in which corn and meat and milk are translated into flesh and blood and brain is indeed most wonderful. And when they are so changed, it is as miraculous how the blood nourishes the various organs.

But most mysterious of all are the relations between mind and body, the gulf between life and death. A railway signal is misread or overlooked, a horse runs away, a compass gets out of order, we miss our balance, a thousand and one possibilities of accident surround us every moment. And even in ourselves we carry the elements of our own destruction: the bursting of a blood-vessel in the brain, a failure of the heart, a minute change in the nervous system and all is over. What was a living, speaking, feeling, thinking mind becomes a mere mass of inanimate matter.

We are, indeed, "fearfully and wonderfully made," nor can we yet by any means realize our extraordinary complexity. Spinoza states it as an obvious truth that "the human mind must perceive everything which happens in the human body." This is, however, the very reverse of the case. As a matter of fact we are intensely ignorant—even the most learned physicians know little—of what is passing within us. That something must take place in the brain when we speak, or read, or think, is obvious; but what that is we have no idea. How do we see, or hear, or feel, or smell? The most advanced physiologist cannot tell us. We know, indeed, very little about our own bodies. Take, for instance, the mechanism of the senses.

As regards touch, there are in the skin, especially of the hands and tongue, certain minute corpuscles each connected with a nerve, some organs of touch, others and different ones for the transmission of the sensations of heat and cold, which apparently are not opposite sensations of the same, but perceptions of different organs; but how these impressions are transmitted to the brain, and how they are there transmuted into sensations, we are absolutely ignorant.

As regards taste, there are on the tongue many thousands of minute bud-like groups of special cells which are supposed to be the organs of taste; but how they are affected, and in what different manner, by different flavours, and how these are realized in the brain, we are again entirely ignorant.

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\*From "Peace and Happiness." By Lord Avebury. New York: The Mac-Millan Company. 1909.



As regards smell, the mucous membrane of the nose contains certain yellow or brownish cells differing from the rest, but showing no visible structure which throws any light on the problem; and how these convey to the brain the multiplicity of odours, and how the brain deals with them, we are again entirely ignorant.

The drum of the ear receives the vibrations of the atmosphere and transmits them through a complex chain of small bones—which are considered to intensify the vibrations—to the labyrinth, on which the final filaments of the auditory nerve are distributed. It has been suggested that the wonderful organ of Corti—a series of some 4,000 minute arches—are, as it were, the keys on which the sound-waves play, almost like the fingers of a performer on the keys of a musical instrument. This may be the case, but even so it affords no ultimate explanation. The ear is a complex and delicate organ, but it does not explain the sensation of sound or the difference of notes.

Consider, again, the eye. Externally comes the cornea, then the aqueous humour, the iris, the lens, the vitreous humour, and finally the retina, which is no thicker than a sheet of thin paper, and yet consists of no less than nine separate layers, the innermost being the rods and cones, which are the immediate recipients of the undulations of light. The number of rods and cones in the human eye is enormous. At a moderate computation the cones may be estimated at over 3,000,000, and the rods at 30,000,000.

All this constitutes a wonderful optical instrument. The landscape is focussed on the retina, as on a photographic plate; the image is constantly becoming visible, and the wonderful plate is continually being washed clean and prepared for another impression. But this does not carry us much farther. What happens when the image is focussed on the retina? How are the impressions conveyed to the brain? We have not merely to deal with outlines, but with shades, and, still more wonderful, with colours. How these are transmitted to the brain, and how they are realized in the brain, we are again entirely ignorant.

Consider, again, the processes of digestion. We partake of a meal and transmute our food into flesh and bone, and fat and blood, tendons and skin, miles of arteries and veins, lungs and liver, and a hundred other substances and fluids, each with different properties and uses. But how these wonderful chemical changes take place we know not.

In the same way I might analyse the other changes which are continually proceeding in our complex organisation—secretion, the formation and circulation of the blood, and many other functions; but each description would lead up in the end to a confession of ignorance!

How little, then, we know, and yet in another sense how much

we know! The existence of memory is so familiar that we do not realize what a marvel it is. In one sense even the most ignorant of us have an almost inexhaustible stock of knowledge. What innumerable facts are stored up in our brains—recollections of childhood, of friends and relations, sounds and tastes and smells, pictures of places and faces, poetry and song, names of friends and relations, of kings and heroes, of statesmen and poets, dates and quotations, facts and fancies; what innumerable details and memories! But how are they perceived, where are they stored, and how are they restored when we choose to recall them?

Man is indeed a miracle, endowed with "the priceless gift of life, which he can have but *once*, for he waited a whole Eternity to be born, and now has a whole Eternity waiting to see what he will do when born,—*this* priceless gift we see strangled out of him by innumerable packthreads; and there remains of the glorious possibility, which we fondly named Man, nothing but an inanimate mass of foul loss and disappointment, which we wrap in shrouds, and bury underground,—surely with well-merited tears. To the thinker here lies tragedy enough; the epitome and marrow of all tragedy whatsoever."\*

The complication, however, of our bodily structure is so great that the marvel is, not our being sometimes ill, but our being ever well. No wonder that we suffer at times; but happily, if pain is excessive, it must needs be short.

The relations of the body and soul are as mysterious, and have given rise to as much controversy, as those between faith and works. St. James tells us that "as the body without the spirit is dead, so faith without works is dead also"; and as the body without the spirit is dead, so, in this world at least, the mind acts through the body. Moreover, we have only one body, and can never have another. The ancient Egyptians believed that after death the soul could visit and occupy any representation of the body, and they provided the spirits of their friends with many "ushabtis" to choose from. Our spirit has no such power of selection.

To lead a happy and useful life, then, we must give reasonable care and attention to the body, and yet how reckless we are! We stuff it with food, poison it with drink, overwork it unnecessarily, let it rust in idleness, abuse it, ill-use it, injure it, neglect it; and suffer terribly, but justly, for our errors.

Though no man can add a cubit to his stature, we can all make ourselves ill, and most of us can keep ourselves well. Most people will keep fairly well if they eat little; avoid alcohol and tobacco; take plenty of fresh air and exercise; keep the mind at work, and the conscience at rest.

The ideals of different races and centuries have no doubt been

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\*Carlyle.

very different. With us cleanliness is next to godliness. With our ancestors it was the very reverse, and dearly they paid for their error in plagues and black death. According to the Venerable Bede, St. Etheldreda was so holy that she rarely washed, except perhaps before some great festival of the Church; and Dean Stanley tells us in his *Memorials of Canterbury* that after the assassination of Becket the bystanders were much impressed, for "the austerity of hair drawers, close fitted as they were to the bare flesh, had hitherto been unknown to English saints, and the marvel was increased by the sight—to our notions so revolting—of the innumerable vermin with which the haircloth abounded—boiling over with them, as one account describes it, like water in a simmering cauldron. At the dreadful sight all the enthusiasm of the previous night revived with double ardour. They looked at each other in silent wonder, then exclaimed, 'See, see what a true monk he was, and we knew it not,' and burst into alternate fits of weeping and laughter, between the sorrow of having lost such a head, and the joy of having found such a saint."

Yet however good our health may be, however carefully we may regulate our diet and our habits, the body is so powerfully affected by the mind, that, as every skilful physician knows, it is often the mind rather than the body with which he has to deal. We may often say with Macbeth to the physician:

Canst thou not minister to a mind diseased,  
Pluck from the memory a rooted sorrow,  
Raze out the written troubles of the brain  
And with some sweet oblivious antidote  
Cleanse the stuff'd bosom of that perilous stuff  
Which weighs upon the heart?

And yet some, through vice or weakness, still more through ignorance, sin against their bodies. We are "fearfully and wonderfully made," our body is so perfectly arranged and adjusted and constructed, so beautifully adapted to its purposes and surroundings, that to spoil and ruin its delicate and complicated mechanism is not only a terrible mistake, but a grievous sin.

We take much pains over breeds of sheep and cattle and horses, but what is most important is to improve the breed of men—bodily, mentally, and spiritually. Prosperity will not do this. Unless well used it is a peril. Comfort, and still more luxury, are dangers; a beautiful climate is apt to relax the fibres; a stern, cool, even cold one braces the nerves and knits the muscles. Madame de Swetchine well said\* that "La racine de sainteté est santé. Il faut pour devenir sainte qu'un âme soit saine."\*\*

\*Quoted by Sir M. E. Grant Duff, *Diary*, 1896-1901.

\*\*The root of sanctity is health. To become a saint it is necessary that the mind be sound.



Moreover, no doubt it is much easier to be good when we are feeling well and strong. If we are in pain or overwrought, things which are comparatively trifling upset us. Small troubles, which under other conditions we should scarcely notice, vex and annoy us.

Wealth and power can give no immunity, but rather multiply temptations and increase anxieties. Dr. Radcliffe is said to have told William III. that he would not have His Majesty's two legs for His Majesty's three kingdoms.

Some people, no doubt, are born with a bad constitution—with the seeds of diseases for which they are not responsible. But it is probably not an exaggeration to say that for nine-tenths of what we suffer we are ourselves responsible.

Mr. Taylor in his work on golf tells us that "to maintain anything approaching his best form, a golfer must of necessity live a clean, wholesome, and sober life. . . . A man must live plainly, but well, and he must be careful of himself. If he uses up the reserve force, or abuses himself in any way, then he has cast his opportunities aside, and he drops immediately out of the game. There are no half-measures. You must do one of two things: be careful of yourself in everything, or forsake the game altogether. A man who lives a careless or a vicious life can never succeed in golf, or hope to keep his nerves and his stamina."

What applies to golf is equally true of life generally. We all know that we can make ourselves ill, but scarcely realise how much we can do to keep ourselves well. Moderation is all-important, moderation in eating as well as in drinking. Probably nine people out of ten eat and drink more than they need—more than is good for them. An occasional feast matters little; it is the continual daily overloading ourselves with food which is so injurious, so depressing. It is easy to eat too much; there is no fear of eating too little. A light stomach, moreover, makes a light heart. High feeding means low spirits, and many people suffer as much from dyspepsia as from all other ailments put together.

As we are now situated, scarcely any time spent in the open air can be said to be wasted. Such hours will not only not be counted in life, but will actually add to it, will tend to make "your days long in the land."

Bodily pleasures are fleeting and often dearly bought. Food from the time of Eve has brought sorrow and death on man. "*Plures occidit gula quam gladius.*"\* "Of all rebellions," said Bacon, "the rebellions of the belly are the worst." Shut your mouth and save your life. Men do not generally die "a natural death," they kill themselves, and die much sooner than they need. The way to live long is to live wisely, and especially to be moderate

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\*"The throat kills more than the sword."

in all things. Food in moderation is a daily satisfaction, and it was a friendly wish:

Now, good digestion wait on appetite,  
And health on both.\*

Too much to eat is almost as bad as too much to drink. Timotheus, head of Athens, having had a frugal supper with Plato, and meeting him next day, said, "Your suppers are not only agreeable whilst I partake of them, but the next day also."\*\* The mind cannot work freely when the stomach is full. Fasting has always been considered as a preparation for prayer, and indeed for any intellectual exertion.

Over-eating leads to dyspepsia, low spirits, and many other evils. Drink is even more fatal. "Oh God, that any one should put an enemy in their mouth to steal away their brains."† Drunkenness is the great curse of northern nations.

Who hath woe? who hath sorrow? who hath contentions?  
Who hath babbling? who hath wounds without cause?  
Who hath redness of eyes?  
They that tarry long at the wine:  
They that go to seek out mixed wine.  
Look not thou upon the wine when it is red,  
When it giveth his colour in the cup:  
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At the last it biteth like a serpent,  
And stingeth like an adder.††

That drink leads to poverty is but a small part of the evil; it is not that a man has made himself a beggar, but that he has made himself a brute—or rather worse than a brute. His punishment is not so much that he suffers; what is worst is that he has brought the suffering on himself. This is the terrible, the intolerable, part. It is not the result of the vice, but the vice itself which fills up the cup of bitterness.

The danger of drink is due to its insidiousness. *In vino veritas*—wine at first seems to promote truth, conversation, and good-fellowship. The young man sits down, perhaps, feeling a little dull, gloomy, and disheartened; he takes a little wine, and the ideas come more quickly, words occur to him, care is forgotten, hope revives, he feels in sympathy with mankind, his heart is cheered; he was despondent, and he is happy, another glass and he will be glorious. But alas! the rich landscape was a mirage, the bright vision a dream, the free flow of words ends in an indiscretion, the feelings of friendship in a quarrel, and the vivacity of the brain

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\*Shakespeare.

\*\*Cicero, *The Tusculan Disputations*.

†Shakespeare.

††Proverbs.

in a racking headache. Even genius sometimes falls a victim to the bottle, as in the old Eastern tale.

Education ought to banish dulness, which is one of the great dangers of life. How many have been ruined by giving way, in Martineau's words, to the "fearful impulse to alternate the stagnant blood of dulness with the throbbing pulses of revelry."

Statistics seem to prove that teetotallers live longer than those who take alcohol, even in moderation. Alcohol is bad not only for the body, but for the mind. It makes men quarrelsome, it inflames the passions, makes them more hard to resist, and increases the difficulty of living a pure life.

"All our trouble," said Jeremy Taylor," is from within us; and if a dish of lettuce and a clear fountain can cool all my heats, so that I shall have neither thirst nor pride, lust nor revenge, envy nor ambition, I am lodged in the bosom of felicity; and, indeed, no men sleep so soundly as they that lay their head upon Nature's lap."\*

The body in health is a marvelous and beautiful piece of mechanism, which is entrusted to us, and of which we are bound to take the greatest care. Just because of its beauty and perfection it is a disgrace to us if, through any fault of ours, it is marred or injured; and just because of its beauty and perfection in health, it becomes repulsive and loathsome if we neglect or misuse it. We make it as we please, either a glorious temple or a ghastly ruin.

We cannot, however, live without food and drink. Nicole refers\*\* to these necessities of food and drink with some humiliation. "Il lui faut nécessairement de la nourriture pour faire agir les ressorts de son cerveau, sans quoi l'âme ne peut rien. Qu'y a-t-il de plus humiliant que cette nécessité? Pour vivre il faut mourir tous les jours, en cessant de penser et d'agir raisonnablement . . . qu'il plaît à Dieu de le réduire ainsi tous les jours à l'état et à la condition des bêtes."†

The Romans had two excellent proverbs about work—"Labor omnia vincit," and another which, though less known, is quite as true, "Labor ipse voluptas."†† The two sayings are closely related. Victory even in trifles is a pleasure. We all love to win a game, and some cannot help showing their annoyance if they lose. If, then, it is true—and who can deny it?—that work will win in the end, it is obvious that it will bring happiness with it. The man who takes an interest in his work—as every one should—will find it, whatever it is, a real pleasure. The body and soul are both made

\**Sermons.*

\*\**Essais de Morale.*

†Nourishment is necessary for the body to bring about activity of the brain, otherwise the mind is nothing. What is more humiliating than this necessity? To live it is necessary that the body die each day by ceasing to think and to act reasonably; thus it pleases God to reduce the human being each day to the state and condition of an animal.

††"Labour conquers all difficulties," and "Labour is itself a pleasure."



for use, and neither can rest until it has worked. Idleness means rust. Some people take indolence for patience, but the two are very different. Moreover, work secures for us the blessed and mysterious gift of sleep, which cares and responsibility often steal away.

How many thousand of my poorest subjects  
Are at this hour asleep! O sleep, O gentle sleep,  
Nature's soft nurse, how have I frightened thee,  
That thou no more will weigh my eyelids down  
And steep my senses in forgetfulness!\*

Sleep has been well described as nature's soft nurse, the mantle that covers thought, the food that appeases hunger, the drink that quenches thirst, the fire that warms cold, the cold that moderates heat, the coin that purchases all things, the balance and weight that equals the shepherd with the king and the simple with the wise. For this inestimable blessing we need not, like Hera, go to Lemnos. If the day is wisely spent, the night will bring sweet rest. No doubt there may be times of trouble, trouble of mind or trouble of body, when the power of sleep leaves us. I have gone through such a period myself, and most distressing it is. But the great danger is lest one should be induced to obtain sleep by means of drugs. That temptation should be resisted at any cost, and if a sensible life is led, the blessed gift of sleep is sure ere long to be restored.

We are all young again in our dreams. Sleep seems to take the weight off our lives, a load off our spirit. We float or fly lightly through the air of fancy; we see those we have lost; range over the world, not only free from limits of time or geographical space, but from the trammels of reason, and soar into higher regions of fancy, catching mysterious gleams of a higher, and even better world.

In sleep our better selves to us return,  
Untroubled by the passionate desires,  
The evil thoughts that in the daytime burn,  
And eat our hearts out with their baleful fires.

To rest in peace is not so easy as it might seem. If in hours which ought to be hours of rest we allow the mind to brood over grievances, to dwell on difficulties, to harass itself with cares, and grieve over suffering and sorrows, we shall find leisure even more exhausting than work. A bad night takes more out of a man than a hard day's work. We should resolutely put all worrying thoughts away from us. No doubt it is difficult to put away cares and troubles; indeed if we leave the mind empty they will force their way in; to keep out evil and sad thoughts we must fill ourselves

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\*Shakespeare.

with good and cheerful ones. Some book about ancient history or prehistoric times, some work on geology or the remote regions of astronomy, some story of character or adventure will carry us away from the petty cares and troubles of everyday life. It is delightful in such times to escape from the present, its struggles and jealousies, and float away in the misty past or the distant regions of illimitable space.

An uneasy conscience is, of course, fatal to peaceful rest. "Si on n'a pas," said La Rochefoucauld, "son repos en soi-même, il est inutile de la chercher ailleurs."\*

To the seers and prophets of old revelation came generally by night, and in dreams, not in the brilliant and garish light of day. We see most things by the light of the sun, and yet when night comes and the heavens are lit up by millions of stars, we find that the sun hides from us even more than it reveals. So now also even in these perhaps prosaic times, it is not in the bright sunshine, but rather in the soft and mysterious moonlight, that we seem to get glimpses of the infinite.

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\*If one has not peace within himself it is useless to look for it elsewhere.

# MEDICAL AND SURGICAL PROGRESS.

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## SURGERY OF THE LYMPHATIC VESSELS.

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### A REVIEW OF RECENT LITERATURE.

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By P. G. SKILLERN, JR., M. D., of Philadelphia.

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16. Gamgee (*Birmingham Med. Rev.*, 1911, Vol. LXIX, pp. 1 and 5).
17. Grant (*Lancet-Clinic*, 1913, Vol. CIX, p. 282).
18. Gross (*Deutsche Zeitschr. fuer Chir.*, 1914, Vol. CXXVII, pp. 1 and 168).
19. Handley (*British Med. Jour.*, 1910, Vol. I, pp. 853 and 922).
20. Haslam (*West. Med. Rev.*, 1912, Vol. XVII, p. 123).
21. Huggins (*Surg. Gynec. and Obstet.*, 1911, I, p. 276).
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23. Kondoléon (*Münch. med. Wochenschr.*, 1912, Vol. LIX, p. 2,726).
24. Lanz (*Bull. et mém. Soc. de chir. de Paris*, 1912, N. S., Vol. XXXVIII, p. 1,340).
25. MacLeod (*Proc. Roy. Soc. Med.*, 1912-13, Vol. VI, Dermat. Sect., p. 154).



26. Mitchell (*Jour. Med. Research*, 1911, Vol. XXIV, p. 97).
27. Moore (*Surg., Gynec. and Obstet.*, 1912, Vol. XV, p. 30).
28. Murphy (*Surgical Clinics*, Vol. V, August, 1916, p. 699).
29. Nichols (*West Canada Med. Jour.*, 1911, Vol. V, p. 175).
30. Opie (*Jour. Med. Research*, 1913, Vol. XXIX, p. 131).
31. Orr, Rows & Stephenson (*Rev. Neurol. & Psychiat.*, 1913, Vol. XI, p. 349).
32. Piot: "L'oblitération cancéreuse du canal thoracique," Paris, 1911).
33. Sanguinetti (*Univ. Med. Rec.*, 1914, Vol. VI, p. 299).
34. Shattuck (*Boston Med. and Surg. Jour.*, Vol. CLXIII, p. 718).
35. Sikora (*Presse med.*, 1913, Vol. XXI, p. 111).
36. Strasser (*Med. Klin.*, 1915, Vol. XI, p. 727).
37. Syms (*Annals of Surg.*, 1913, Vol. LVII, p. 785).
38. Taylor (*Ibid.*, p. 941).
39. Taylor (*Lancet-Clinic*, 1914, Vol. CXI, p. 509).
40. Wile (*Trans. Clin. Soc. Univ. Mich.*, 1914, Vol. V, p. 133).

In the introduction of his Hunterian Lecture on this subject Handley berates the profession for paying little or no attention to the surgery of the lymphatic system, saying: "The subject of lymphatic anatomy, which necessarily forms the basis of lymphatic surgery, is still denied by most teachers of anatomy the prominence due to its practical importance, except for Sappey's folio and the works of Poirier, Cuneo, and Leaf. Quite recently Prof. E. H. Starling's work, "The Fluids of the Body," seems to have placed lymphatic physiology on a basis as secure as that occupied by the anatomy of the subject. On the other hand, the problems presented to the surgeon by disease of lymphatic vessels and spaces have, perhaps, hitherto received less than their share of attention." Handley brought forth his theory of lymphatic permeation in 1904, and, partly based upon this work, devised his well-known operation of lymphangioplasty by means of silk strands, which was first published in the *Lancet* for March 14th, 1908. In the Hunterian Lecture, Handley covers the surgery of dropsy under the following headings: (a) lymphatic edema; (b) serous effusions; (c) cancer surgery as a branch of the ablational side of lymphatic surgery.

The practical question must arise, What are the results of *lymphangioplasty*? Clarke reports 2 cases of persistent edema successfully treated by Handley's method, one involving the lower extremity and the other the upper. Gamgee also reports two successful cases and adds, "In lymphangioplasty we seem to have a means of treating, so far as relief of pain is concerned, an hitherto untreatable condition. Maintenance of asepsis is difficult." Haslam is of the same mind and adds that the possible relinquishment of the use of morphine likewise constitutes a great gain; he then reports a successful plasty upon a case of chronic lymphangitis with solid edema of the leg. Parker Syms gives the bibliography to date, collects the reported cases of lymphangioplasty, and adds his own cases. He has met with success in a limited number of cases of chronic edema of the face and of the leg not due to elephantiasis. He feels that its greatest usefulness is in cases of ascites due to cirrhosis of the liver, and here suggests that lymphangioplasty (Lambotte) should be combined with the best form of omentopexy.

Syms concludes that the immediate results of Handley's operation are usually very promising, the swelling often disappearing rapidly, but the end-results are apt to be disappointing. In the discussion Taylor stated that he performed lymphangioplasty upon a woman whose upper extremity swelled tremendously following a dogbite, and also in a case of marked edema of the lower eyelid following a scar; both cases were successful.

Lanz, of Amsterdam, devised another method. In the case of a male whose right leg was hard from edema, he split the fascia lata, trepanned the femur at different levels, and implanted three bands of fascia into the medullary cavity. He then made a series of openings in the fascia lata, thus trying to establish a communication between the superficial lymphatic system and the intramuscular and deep lymphatic systems. Kondoléon, of Athens, in the same year, described a not dissimilar method, of which the principle, in cases of long standing, is to establish a lymph passage, from the subcutaneous cellular tissue, where the lymph stasis is, to the muscles, by removing a large part of the deep fascia, which forms the obstruction; and in less severe cases, to establish a small communication by inserting strips of fascia into the muscles. The technique is to make two longitudinal incisions, one on the outer, the other on the inner side of the leg, and if the thigh is involved, add incisions on the thigh. Retract skin. Extirpate infiltrated fat which covers the fascia. From each incision remove a piece of fascia the length of the incision and three or four fingerbreadths in width, thus exposing the muscles. He then reports 7 cases treated by his method, and adds that no functional disturbances have followed. Strasser reports a case of elephantiasis nostras successfully operated upon by Kondoléon's method. The surface of the fascia had a milky appearance, and upon removing it lymph flowed all over the floor. After operation the edema of the lower limb decreased rapidly. Recurrence may ensue from the fascial windows becoming closed by connective-tissue, but the operation could readily be repeated two or three times.

*Lymphangitis* is growing to be a disease of enormous practical importance, the recognition of which is increasing year by year. Writing on acute lymphangitis Coues states with truth that most of the authoritative books give but a cursory description of the process and likewise of its treatment. He divides the disease first into two types, the *acute reticular*, which involves the reticular or mesh lymphatics, and the *acute tubular*, which involves the large tubular trunks; secondly, into (a) primary, and (b) secondary to some acute suppurative process. In his conclusions Coues states that acute lymphangitis is a subject well worthy of the surgeon's thought. A patient with this trouble harbors possibilities for most profound systemic disturbance. The most important treatment is absolute rest with immobilization of the part affected, as in a fracture. Lymphangitic nodes (irritative) should never be incised; they swell up on account of the poison (septic lymph), act as barriers to it, and their removal may flood the individual with a disastrous infection. The simple cases almost invariably get well without incisions, which are rarely indicated; pus infection is not a common complication in the primary form.

Orr, Rows and Stephenson take up the question of the spread of infection by the ascending lymph stream of nerves from peripheral



inflammatory foci to the central nervous system. That the spinal cord and brain are exposed to infection along this path cannot be doubted. This view is based upon both clinical and experimental data. Previous experimental work by the same authors has shown that infection of the lymph system of peripheral nerves causes an ascending neuritis which spreads upwards to pass over the posterior root ganglia and along the spinal roots to the cord. The tissue which shows the greatest degree of inflammation is the loose areolar tissue covering the perineurium, the ganglion capsule, and the dura mater. The adventitial elements of the veins and capillaries contribute very largely to the inflammatory exudate. Within the cord the inflammation diminishes in degree from without inwards. The clinical cases now presented merely apply to the human subject the phenomena previously observed. Six out of 7 cases reported showed meningomyelitis secondary to ascending neuritis. The dura forms an important defence mechanism, and, with the highly vascular epidural tissue, neutralizes to great extent the pathogenicity of organisms and toxins *via* the lymphogenous path.

Here is a possible path by which infection travels in tetanus, hydrophobia, and poliomyelitis.

Deaver and Pfeiffer contribute original observations upon the subject of *pancreatic lymphangitis*. This disease depends upon the existence of primary infectious processes, so situated with reference to lymphatic vessels that the infection may more or less readily reach the pancreas through these channels. They cite Bartel's study of the lymphatics of the pancreas. The distribution of inflammation corresponds to the lymphatic distribution. They show that the biliary tract and the duodenum furnish infection to the pancreas *via* the lymphatics. The treatment, therefore, is that of the primary focus of infection, whether cholecystitis, cholelithiasis, ulcer or duodenitis. The lymph-nodes enlarge and there is nodular thickening of the pancreas.

As regards *infection of the retroperitoneal lymphatics*, Moore, after mentioning the three groups of lymphatics in the retroperitoneal space—the celiac, the mesenteric, and the lumbar—states that we would naturally expect this large space behind the peritoneum, with its abundant areolar tissue and free lymphatic communication with parts so frequently the seat of infections, to be a very common location for abscesses. The chances are that owing to the inaccessibility of these parts, infections, and even abscesses, often occur here that are not recognized. When chills, fever and sweating are present, the cause of which is not found in any of the usual locations, or when these symptoms continue after thorough drainage of pelvic or abdominal abscesses, the retroperitoneal space should be suspected. It is quite possible that in many instances where patients have died from sepsis without the abscess having been discovered, it was located in this region. The reported causes of non-tuberculous abscesses in the retroperitoneal space are typhoid, appendicitis, salpingitis, infection following abortion and parturition, and suppuration of inguinal nodes. Moore reports 4 cases, the first following appendicitis, the second, miscarriage, the third, erysipelas of the foot, and the fourth, labor, the patient having contracted a pneumococcic infection from using the same bedpan used by her father who had pneumonia a short time previously. Huggins gives the bibliography and adds two personal cases, the



first being an infection of the mesenteric nodes following typhoid fever, *B. typhosus* being obtained in pure culture, and the second a perinephritic abscess following parturition.

Murphy discusses the subject of *subperitoneal streptococcic cellulitis* associated with (a) appendicitis; (b) pharyngitis; (c) parturition. In this condition the streptococci spread like wildfire through the subperitoneal lymph-spaces, and there are redness and edema of the peritoneum, with scanty exudate into the peritoneal cavity itself. When this condition is recognized, the results are much better without operation.

Sikora goes extensively into the subject of *wounds of the lymphatic system*, including lymphorrhea, coagulation of lymph, lymph fistulæ of the extremities and elsewhere, their modes of termination, tuberculous and non-tuberculous lymphangitis, and the treatment of these conditions, mentioning Farabeuf's incision to expose the brachiocephalic trunk and Jonnesco-Jiano's systematic ligation of the thoracic duct for certain abdominal tumors. He cites a case of Desjardins—a lymph fistula which discharged for two days at the rate of 125 grm. an hour. A bibliography is given. Daval covers almost the same ground, but much more extensively. Grant takes up the subject of wounds of the thoracic duct in the neck with leakage, reviewing the anatomy and surgical measures for control of thoracic duct fistulæ—in order of desirability, compression, suture, and ligation. Boulard covers the same subject in a monograph.

In a paper entitled "Thrombosis and Occlusion of the Lymphatics," Opie contributes the results of experimental work. Part of his conclusions are that occlusion of the thoracic duct or of large lymphatic trunks is followed by transient edema which is relieved in part at least by the establishment of a collateral lymphatic circulation. After ligation of the thoracic duct the flow of lymph into the vascular system may be re-established within from two to four days: (a) By the formation of a new channel entering the proximal part of the ligated duct, or (b) by collaterals freely joining the right thoracic duct. (c) In other instances no re-establishment of communication with the vascular system could be demonstrated, but there was no widespread edema. Copious chylous ascites may follow occlusion of the thoracic duct in association with injury to a mesenteric lymphatic vessel. In a few instances continued diarrhea follows occlusion of the thoracic duct.

Benedict reports an interesting case of lymphedema: elephantiasis, ascites, obstruction at or near receptaculum, non-filarial. Necropsy revealed a tumor low down in the thoracic duct. A female, fifty-five years of age, had 'square-piano' legs (*pantalon de zouave*), marked ascites and dropsy of abdominal wall up to navel. The lymphatics became larger as they crossed down the abdomen, being about the size of large quills and translucent. There was no fluid in the pleural cavities. Treatment by means of salt-free and nearly water-free diet removed the ascites. There was anemia, Rbc being 3,000,000. The picture presented by the case of Creyx and Gauvenet was somewhat similar, but the cause of the obstruction was secondary cancer of the thoracic duct. In a monograph Piot considers secondary cancer of the thoracic duct, taking up the history, etiology, symptoms (edema beginning in the feet

and slowly and progressively advancing), diagnosis, pathologic anatomy, pathogenesis, and gives an extensive bibliography.

Tumors of lymphatic vessels, *lymphangiomata*, appear frequently in the literature. Abbe reports radium cures in these tumors, which were situated in the tongue in 3 cases, in the leg in the fourth (hemolymphangioma), and in the skin of the neck in the fifth and sixth (pure lymphangioma of the congenital type). Burkholder details an interesting condition of the conjunctiva, for which he proposes the name of 'lymphangiectasis multiplex.' The condition was that of numberless straight chains of multiple moniliform enlargements or dilatations, all radiating from the cornea as a center, like spokes of a wheel, and extending to the fornix conjunctivæ. The dilatations were about 9.75 mm. in diameter and all of about the same size; they were emptied by pressure.

Mitchell examined pathologically a primary tumor of the lymph-vessels of the axilla and classed it as a typical lymphoma. Cases of *lymphangioma circumscriptum* are reported by Wile, MacLeod, and Bechet. The axilla seems to be a frequent site of lymphangioma (Drew), and lymphatic cyst (Nichols): Fitzwilliams's case was an extensive lymphangioma, a large portion of which was situated in the chest, while on coughing and straining the root of the neck fills up and bulges in a prominent manner, resembling a hernia of the lung. (Cf. case reported by Murphy, "Clinics," February, 1916, pp. 1-5.) In Taylor's case of congenital occlusion and dilatation of the lymph-channels of the right arm, the umbilical cord was wrapped twice around the upper arm, and the arm was thus held above and behind the occiput. The arm has increased in size in proportion to the normal gradual growth of the rest of the body.

The pathology of that uncanny malady—*status lymphaticus*—has been studied by Crossfield and also by Clark.

The literature abounds with reports of cases of *elephantiasis*, which, however, are mostly medical curiosities, all manner of enlarged limbs being classified under this caption. In a paper entitled "Etiology of Elephantiasis," with bibliography, Shattuck tries to straighten the subject out, and his summary of the etiology is interesting. The practical question is that of cure. Jeanbrau claims good results from heliotherapy, while the operative procedures have already been referred to.

Fischer presents an exhaustive review of the affections of lymph-vessels up to 1901. Gross, too, covers a very great deal of ground, making extensive citations of cases from the literature up to 1914: he covers the subjects of obstruction and other congenital and acquired affections of the thoracic duct (absence of, thrombosis of, anomalies of, wounds of, stone in, termination in vena azygos), chylous ascites, lymphangioma circumscriptum, lymphatic cysts, elephantiasis, etc. These two articles,—which are practically monographs upon the subject of our review,—are recommended to those who wish to pursue the theme in greater detail.

The limits of space forbid a consideration of affections of lymph-nodes, the spleen, and other portions of the lymphatic system, such as the tonsils, Peyer's patches, etc. Most of the papers upon the affections of lymph-nodes have to do with Hodgkin's disease, which was first described by Hodgkin at a meeting of the Royal Medical and Chirurgical Society in 1832, and concerning the nature of which heated controversy has arisen ever since. Sanguinetti reviews the recent literature upon this subject.



## BOOK REVIEWS.

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**THE PRACTICAL MEDICINE SERIES.** Comprising Ten Volumes on the Year's Progress in Medicine and Surgery. Under the General Editorial Charge of Charles L. Mix, A. M. M. D., Professor of Physical Diagnosis in the Northwestern University Medical School. Volume II—General Surgery. Edited by John B. Murphy, A. M., M. D., LL.D., F. R. C. S. England (Hon.), F. A. C. S., Professor of Surgery in the Northwestern University, Chicago, etc. etc. Series 1916. Chicago: The Year Book Publishers. 1916. Price, \$2.00.

This volume of the "Practical Medicine Series" is always a welcome visitor, for although one can hardly be expected to read from cover to cover, one nevertheless may profit much by a careful thumbing of the pages. Such a procedure, practised at odd moments, enables one to check up his reading for the past year and fill in the gaps here and there. Considering the handy, comfortable size of the book it is remarkably full, and furthermore it is accurate and safe as a guide.

The topics are arranged according to a regional classification that is very full. References to the literature are furnished in abundance, and there is a very full index to cover both authors and subjects.

**THE CLINICS OF JOHN B. MURPHY, M. D.,** at Mercy Hospital, Chicago. Edited by P. G. Skillern, Jr., M. D., of Philadelphia. Volume V, Number 3. June, 1916. Published Bi-Monthly. Philadelphia: W. B. Saunders Company. 1916. Price per year, \$8.00.

The volume opens with a short talk by Dr. Coffey, of Portland, Oregon, on "Certain Abdominal Operations," following which are clinical demonstrations of Multiple Sarcomata of Skin, Infective Costal Perichondritis, Diverticulum of the Esophagus, Acute Calculous Cholecystitis, Acute Cholecystitis with Pancreatitis, Chronic Cholecystitis, Carcinoma of the Gall-Bladder, Pyloric Obstruction Due to a Band, Ulcer of the Duodenum, Obturation Ileus, Post-Operative Ventral Hernia, Peritoneal Carcinosis, Tuberculous Peritonitis, Fecal Fistula, Polyposis of the Sigmoid, Perirectal Sinus, Carcinoma of the Rectum, Uterine Fibroids, Extra-Uterine Pregnancy, Pyosalpynx, Neoplasm of Both Kidneys, and Vesical Calculus.

**DIAGNOSTIC METHODS.** A Guide for History Taking, Making of Routine Physical Examinations and the Usual Laboratory Tests Necessary for Students in Clinical Pathology, Hospital Internes, and Practicing Physicians. By Herbert Thomas Brooks, A. B., M. D., Professor of Pathology, University of Tennessee, College of Medicine, Memphis, Tenn. Third Edition, Revised and Rewritten. St. Louis: C. V. Mosby Company. 1916. Price, \$1.00.

The third edition of this history-taking guide contains a new chapter on the staining and examination of smears. The general plan of the work remains the same with chapters on the more common laboratory diagnostic methods.



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## EDITORIAL.

### RUSSIAN OIL, RUSSIAN DANCES AND RUSSIAN LITERATURE.

In these latter days of much controversy as to who are the real Americans and whether or not the stigma attached to a large hyphen can ever be obliterated by future generations, no matter how strenuous their efforts may be, it would be well for some medical philosopher, who has grown weary of his society for sex hygiene, to turn to the matter of whether the influence of the Russian importations, in the shape of oil, dances and literature, will shortly, or in the next decade, act as a deterrent to the complete Americanization of the foreigner or, which would be much more tragical, result in the metamorphosis of so thorough an American as is he who bears the name of Smith or Jones into a something that has lost all sense of American ideals and has not only changed in character, but also as regards physiognomy and, especially, morals. We are taking Russian oil already, in vast quantities, and while no statistics have as yet been published to show that the re-education of our large intestine is followed by a less saturnine disposition on our part or that the number of suicides has decreased, the fact remains, nevertheless, that with the present complete emptying of that objectionable part of our anatomy the future will bear witness to a change of character in the American people, on account of doing away with those intestinal toxins which undoubtedly have impeded the growth of the three arts: literature, painting and music. No aspiring poet can achieve exceptional results with a large intestine torpid and stubborn in the matter of its proper behavior, and no musician can be a master of the art of cacophony and no painter can harmonize blues with greens and yellows if they are laboring under a like disadvantage. While manufacturers have not had the hardihood to state these enticing qualities in Russian oil or the American substitutes, and while it may be a delusion on our part that they really do exist, it would be well to bear them in mind in case, in the near or far future, some philosopher is in a quandary as to why the American people have deserted their customary commercial ideas for those of a more artistic nature.

But as things stand to-day, it is not only the Russian oil we are consuming that shall bear fruit, but those two other importations—Russian dancing and Russian literature—will beyond a doubt add their quota to the change, slow though it may be, which will overtake the American people. Hardly a decade ago we thought that by hopping around in the ball-room and especially on the stage, we were accomplishing an artistic performance, and that by the monotonous exercise of raising one foot about two inches from the floor and then the other, we were achieving a relaxation of the muscles, a joyful condition of the mind, and a rejuvenation of the circulation that would for years keep our arteries soft. But with the advent of the Russian dancers we soon learned that we had been exponents of a mistaken art, and that though we had worked 'hard' through our dances, the benefits to mind and body were infinitesimal. These dancers, from the part of the world we had always been taught in our delightfully ingenuous school books and also in our literature to regard as a semi-barbaric country, wrenched us out of our dancing apathy, and though to-day we are not as yet adepts in the Russian chorographic art or, for that matter, enthusiastic adherents, there are already indications on the horizon that before long the exercise of all our muscles in the approved Russian style will obtain, and that the man or woman, who cannot do a 'turn' after the manner of Nijinsky or Karsavina to music by Rimsky-Korsakoff or Richard Strauss in a room with Americanized Bakst wall-paper and hangings, will be advised by the supermen in medicine to do so at once, or have during the remainder of his or her life the trinity of self-imposed ills—a low muscular tone, nerves that make for neurasthenia, and a mind that is self-centred and closed forever to color, to harmony, to *joie de vivre*.

Let us revert to those dyed-in-the-wool Americans, the aforementioned Smith and Jones, and witness the transformation in them when, added to the beneficent results from taking Russian oil and indulging in Russian dances, a mastery of the Russian literature, which is now flooding the country, will be attempted by either. To avoid unnecessary details, let us take it for granted that they were brought up on a farm, just as thousands of other Americans have been, or spent their early years in small communities, and only later in life, say, after the age of twenty, migrated to a large city. If they really read anything beside the country newspaper, it was books cast in the 'heroic' mold, in which the poor boy always achieved wealth later on, and married the daughter of a millionaire, thus illustrating the old and threadbare adage: Be good and you will be rewarded. With this substratum of a completed (?) education, a Russian book of the sort published to-day is suggested to them as the proper food for their 'higher' education. The first attempt to understand the story will result in a partial breakdown of their strong nerves, for not only will they lie awake at night wondering why they never knew all the 'things' that the Russian writers mention, but they will cudgel their brains whether Sofya

Lvovna married Vladimir Mihalovitch or Pyotr Petrovitch, or whether it was Olga Semyonova or Ekaterina Pavlovna who deceived her husband. But the temporary insomnia brought on by the attempt to solve these problems will soon pass, for after reading a number of books of a like nature, Smith and Jones will soon become hardened to the onslaughts from the ragged house of immorality, and also simplify the names of the characters so that no longer will they be at sea in regard to marriages, elopements, betrayals and villainy. And yet, will their point of view be the same, will their morals be pleasing to the many societies for social and sex hygiene?

In truth, the Russian invasion is on us, and though it may be contended that it is no concern of the physician, let it be written here that it is. The modern physician with his lack of faith in medicine is daily taking a greater and greater interest in preventive medicine and the improvement of the race. He no longer talks to his non-medical friends on the subjects of fevers and colds, but lingers lovingly and often tiresomely around psychological subjects. And since this is the order of the day, can it be denied in all fairness that the reading of Dostoevsky, Gogol, Artzybashev and Chekhov by the many Smiths and Joneses of purely American stock is of no moment to him? Verily, the day is not far distant when, despite the many swallowings of Russian oil and the improvement of our physique as the result of Russian dancing, our psycho-neurologists will be compelled to hold special clinics for the hyphenated Americans who have singed their brains at the immoral and semi-barbaric fires built by the modern Russian writers! P. S.

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### SOME REMARKS ON DEATH.

The subject of death—its majesty, its importance—has often been commented on by essayists, but rarely has it been treated in the manner in which Mr. Filson Young, the English essayist, treats it in the subjoined essay. Maeterlinck has written a whole book on death, and, with his usual array of symbolisms and his mastery of mysticism and a literary quality that is of the first order, has evolved what might be called a poetical fantasy that lures the reader into thinking of the cessation of life as a release from earthly bondage. But when Maeterlinck wrote his book the Great War was not even faintly glimmering on the horizon, hence there was no thought of the wholesale slaughterings to rob his poetical message of the grandeur and majesty of death. But we have changed all this, and to-day death, as instanced in the European slaughter-house, is of such frequent occurrence that no longer are we fearful or awestruck in its presence. Stripped of its accoutrements, it stands before us now, not in its panoply of majesty, but as "Poor Death," to use the exact title of Mr. Young's essay:

#### I.

Death is inevitable, but life is not; and it would surprise many of us to know how much of our time and effort here is spent in the



avoiding of life. We dodge it when it comes to meet us, turn our backs and run from it in a panic; and then, successfully established in some backwater, see it go roaring and glittering by in all the bravery of its pageantry and all the glory of its song. From these we take cover fearfully and gratefully, like birds that have escaped from the fowler's snare.

There is hardly one of us who is not guilty at some time of the fear and avoidance of life. We shrink from joys almost more than from sorrows, and pursue a kind of peddling happiness, content with the meanest shifts and substitutes if only life will leave us alone. Life, too much life, is uncomfortable, disturbing; it is always waking us up and dragging us forth, blinking, into the sunny torrent where, although great things are happening, we are apt to be bruised and buffeted and have the breath knocked out of us. Adventure is the prelude to civilization, not its fulfilment or harvest; and so in an aging world where civilization works smoothly we turn our backs on adventure, look for ease, dream of peace. As in some close chamber by the sea where there is no clear sound but the ticking of the clock and the chiming of the hours, where the roar of the surf without is reduced to a velvety murmur; so we sit sheltered while the creeping hours and the trampling days and the galloping years pass over us, and the voice of life is hushed to a whisper.

War, such war as is now loose upon the world, is an outrage upon all that. The sealed walls of the chamber gape, and let in the roar of life. But we do not think it is life; we call it death. Rivers of blood are set flowing, and we say that Death is holding high carnival. We think of fields strewn with dead bodies, trenches heaped with them, of areas where life cannot stir a finger or raise its head; we see in imagination ships, whole floating communities of a thousand men with their dwelling-places and workshops and arsenals, their clothes and books and possessions, their fireplaces and larders, all blown sky-high in an instant and disappearing in billowing clouds of greasy brown smoke beneath the waters that a moment ago were their home and their world. We read again those fearful tales of the shattering of homes, the violent destruction and dismemberment of families, the deliberate outraging of beautiful and affectionate things; and when we have read them a few times, these fiendish horrors, things we would never have dreamed of associating with human beings before, become almost familiar to us so that we cease to think about them, and cease to be shocked and horrified at them. They become simply recorded facts, divorced from the violent emotion with which we first heard of them. They merely take their place in what seems an indescribable circus of destruction; our world seems turned upside down, and the kingdom of death established.

It is strange and interesting that it should be so, because this carnival of death which seems so triumphant, so extensive and magnificent, is reduced to rather sorry proportions if we really examine it closely and measure it exactly.

## II.

The first violent change produced in a civilized man when he goes to the front to fight is in his personal attitude towards death. Consider: all his existence hitherto has been based on the assumption

that to be killed would be the greatest calamity that could happen to him. Nearly all his instincts, two-thirds of his education, were directed to the preservation of his individual life. In the crossing of a crowded street a thousand nervous impulses, flashes of thought, muscular actions and reflexes, infinitely marvelous every one of them, were employed in no other business than convoying him across in safety. In what we eat and drink, in what we do and learn, the desire to preserve ourselves and the ability to do so are increasingly manifest, until accident, disease, or old age deliver us into the hands of death.

But in these new circumstances a man is thrown out into a world where his own individual life is of little or no importance; where the thing sought is not an individual but a collective benefit; where it may even be necessary, if the end is to be achieved, for his life to be deliberately given. And he very rapidly becomes so accustomed to this idea, seeing it practised by thousands of others round him, that the violent change in point of view towards death is accomplished almost without his knowing it.

The delicate organization of human life is so adjusted that the same sensation cannot be experienced repeatedly in the same degree of acuteness. It is as though sensation, the power of acutely feeling, were so closely bound up with the life principle that it has to be limited in any one individual, and therefore by the provisions of nature to be protected and husbanded. The sensitive man can feel anything and everything, but if he is to be subjected to the same shock repeatedly, he will cease to feel it. And so it is with Death. The sight of a stranger being killed in the street or mangled by a railway train is enough to affect the nerves and haunt the memories of most people for many days; but when you have seen your comrades mangled and wounded by dozens and hundreds, and your fellowmen tortured and slaughtered in heaps, your outraged nature refuses to register any more sensations of that kind. The very scale and apparent quantity in which death is working defeats its own purpose. Even the people at home whose acquaintance with this wholesale carnage is confined to reading about it, seeing lists and numbers, and occasionally to being aware of a gap in their own circle which will not be filled again, become callous too. Before the war somebody killed by an omnibus in the street was matter for a description in the newspapers; now such a thing would interest nobody, and is not even recorded. Even when it comes quite near us, the loss by accident of our own people or friends is not dwelt upon or thought about as once it was. Death has cheapened himself with us; he has become familiar; and we are beginning to hold him in contempt.

### III.

No man or woman can be said to have true freedom of mind until the fear of death has been banished; and to banish the fear of death it is necessary to face it—not only in one's physical person, but with one's mind. Most of us who have been in circumstances where death is a constant and instant menace—in war, at sea, mountain climbing, or in any high physical adventure—know that we date a certain change in our lives from the time when, being terrified at the instant presence of death, we faced it, and the fear departed from us, never to return. Other fears may return; the much more mischievous fear of life, to which I began by referring, may flourish in



us; but we shall certainly not be afraid of death for ourselves. People who do not know this wonder, when they read of the brave things that men are doing every hour by sea and by land, how they can possibly do them. Well, that is how. It is because the one great bogey and terror of life has been completely exorcised from their minds, and the rest is all adventure, a trial of skill, perhaps an heroic and deliberate sacrifice. Moreover (and I would advise any anxious friend at home to bear this in mind for comfort), the sense that you are doing things and running risks and facing death in a great company is a very inspiring and uplifting consideration. It is another influence of the soothing loss of individuality. You are all in the same boat, you are all running the same risks; and if you fall, you fall in a company with whom it is well to be numbered at this time. It is not that they don't think about death, or put it out of their heads; they do think about it, and they have thought all the terror and sting out of it. They have faced it and have done with it; and they recognize it for the unfearful thing that it really is. Pain and agony, loss, bereavement, remorse, loneliness may be dreadful things; they may all or any of them be associated with death and inflicted by it on the living; but death itself is nothing, and you, when it comes to you, are the one being who will certainly know nothing about it, any more than you know of the moment that you fall asleep.

#### IV.

And strange as the thought may be, even the sum of death is not increased by one single unit for all the slaughter and butchery that is going on. It is appointed unto man once to die—and once only. No amount of war can alter the fact that no man can die more than once; that for every birth there is one death, no more and no less. It may come sooner or later; and by coming simultaneously to an enormous number of men in the prime of their physical life, death reaps an apparent benefit. But it is not a certain one. Life is an ascension to a summit—the highest we manage to achieve—and a descent from it. The ascent may be short and steep, the descent long and dreary. The cruelty of the present circumstances is that death seems to come so very inopportunately, at the moment when life is at the height of fulfilment. That may be loss to us; but it is no loss to those who die. We must remember that about those who are giving their lives for us in the war—certainly the young ones—that they are tasting life in an intensity that they have never dreamed of, and in a measure of which the dimension of time has no equivalent.

The monitory voice of the priest may tell us that in the midst of life we are in death; but the youth who is to-day in the tide of battle and has surrendered himself to it knows also that in the midst of death we may be in life; and that to a degree hitherto undreamed of. He is in a new world, living as he never lived before. It may all go dark suddenly; it is full of petty privations; he may have to pay for it in a lifetime of maimed years; but it has its amazing rewards and compensations. *De torrente in via bibet*; he will find refreshment from waters by the wayside; strange ravens will feed him; and with poor Death stricken down and vanquished within him, he will lift up his head.

P. S. -



# ORIGINAL ARTICLES.

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## NEUROLOGY.

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### PLEA FOR THE TABETIC.

#### WHAT CAN BE DONE FOR THE TABETIC.

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As a rule there is a disposition on the part of many physicians, when they diagnose a case of locomotor ataxia, to give a prompt and unfavorable prognosis, and dismiss the patient with a few words of gloomy advice and perfunctory pity. It is mainly for this reason that these unfortunate patients, afflicted with this serious disease of the nervous system, fall into the hands of quacks and irregular practitioners, who find in them a ready and fertile soil for the exploitation of their illicit practices.

The mental state of the tabetic is such that he falls a ready victim to their wiles. His condition is ever before him, he is easily depressed or exhilarated; any suggestion or effort in therapy often starts one of these patients on a new lease of life. The tremendous influence that can be exerted through this psychic state has long been known.

Electricity, massage, hydrotherapy; glandular extracts and other organic substances; practically every inorganic substance in the pharmacopeia; the treatment by local irritation, urethral stimulation and other manoeuvres, faith healers, chiropractic, and osteopathic manipulation; all have reported cases that have improved by the use of these measures. All doubtless contain elements which confer benefit; one can incite hope by any treatment, and hope begets courage.

Tabes as we all know, is a chronic more or less progressive disease of the central nervous system, whose chief pathological changes are found in the spinal ganglia, in the posterior roots, and in the posterior columns of the spinal cord. It is characterized clinically by two groups of symptoms: (a) Physical, among which the Argyll-Robertson pupil, lightning pains, bladder disturbance, loss of deep reflexes, sensory losses and the ataxic gait are the most

prominent; and (b) the psychic manifestations which are as a rule evidenced by fear, depression, neurasthenia, and morbid irritability. Of this group of mental symptoms, fear is by far the most constant and important; its influence on the maintenance of ataxia is so great, that special reference to it will be made later in the discussion on the treatment of this most distressing symptom.

For convenience of description we will divide the treatment into—  
(a) that directed against the apparent cause of the disease, and  
(b) symptomatic; discussing the treatment of the most important symptoms.

#### CAUSATIVE TREATMENT.

The researches of Noguchi and Moore in this country and many others abroad leave little doubt as to the original causative agent in tabes. The clinical progress and the various biological reactions in the blood and the spinal fluid will determine the activity of the disease and indicate the intensity of medicinal measures to be instituted in a given case. Of the various methods at our disposal, we have

- (a) The intramuscular injections of mercury.
- (b) The intravenous injections of salvarsan.
- (c) The intradural injections of salvarsan (Ravaut).<sup>1</sup>
- (d) The intradural injections of salvarsanized serum (Swift-Ellis method).<sup>2</sup>
- (e) The intradural injections of mercurialized serum (Byrnes).<sup>3</sup>

In the medicinal treatment directed against any active luetic process, the combined use of salvarsan intravenously and the salicylate of mercury intramuscularly has proved to be the method giving the best results. 0.2 to 0.4 grm. of salvarsan should be injected intravenously at intervals of from seven to ten days for six injections; in the intervals injections of mercury may be given. The intravenous injections of salvarsan should be followed for the next ten weeks by the intramuscular injections of mercury (salicylate in doses of one-half to one grain suspended in alboline) once or twice a week; after a lapse of one month the same procedure should be repeated until the activity of the disease, as indicated clinically and by the biological reactions, is arrested.

The intradural injections of salvarsan as advocated by Wechselmann and Marinsco, and later modified by Ravaut, has proved to be less free from danger and is accompanied by much more discomfort to the patient, than the method of Swift and Ellis or of Byrnes.

Reports by many writers who have used the Swift and Ellis method show encouraging results. With the mercurialized serum of Byrnes, in one patient who had been chair-ridden for several years, and who had suffered constant pain, I succeeded, after two injections, in controlling his pain entirely; he remained free from pain for the

next five months. This patient had an intense reaction, both local and constitutional, despite the fact that I had only injected half of the ordinary dose, so I deemed it advisable to discontinue further treatment in his case along these lines. Another patient who also had been chair-ridden for two years, and whom I had succeeded, with Maloney's exercises, in reeducating, so that he was able to walk a distance of one-half mile with practically little or no assistance, improved in general nutrition and in some of his subjective symptoms after three injections.

That indiscriminate intraspinal injections are not entirely free from danger to the patient, is evident from numerous untoward reports in the literature. The opinion of some writers is that the intradural method of administration of salvarsan does not yield any better results than the intravenous injections of that drug. Sachs, Strauss and Kaliski,<sup>4</sup> in a recent article, give an analysis by Prof. Benedict, of ten specimens of blood taken from fifteen to forty-five minutes after the intravenous injection of 0.4 grm. of salvarsan. In 20 c.cm. of whole blood, 0.0001 grm. of salvarsan was found. A similar analysis of spinal fluid twenty-four hours after the intravenous injection of salvarsan, showed that the amount of arsenic in it was from one-sixth to one-tenth the concentration of the whole blood; thus proving, as a matter of fact, that the spinal fluid, twenty-four hours after the intravenous injection of salvarsan, contained more arsenic than the so-called salvarsanized serum. Evidently the recorded biological effects of salvarsanized serum must be due to other coincidental factors; possibly to the intravenous injections of salvarsan and the repeated lumbar punctures.

#### SYMPTOMATIC TREATMENT.

*Pain.*—The most common and one of the most distressing symptoms of tabes is pain; it is present in about 85 per cent. of the cases. It varies in intensity and duration; sometimes it is only a few slight shocks lasting but a short time; or it may be of a severe lancinating type, shooting down the limbs and persisting for days, sometimes weeks, without relief, if untreated. These bouts of pain may come at any time, but are usually in evidence when there is an excessive humidity in the air, or when there is a lowered barometric state.

Every effort should at first be made to control the pain with simple local measures, such as dry heat, counter-irritation, light cauterization, massage, tight bandaging, etc. If despite these means the pain still persists, resort to internal medication is indicated.

Many drugs have been used for the control of this most annoying symptom; aspirine, antipyrine, salicylate of soda, pyramidon, codeine are worthy of note, as having proved most efficient; as a last resort morphine may become necessary to control the attack. It is needless to emphasize that morphine should be used only in extreme



cases where the other drugs have proved ineffectual. The danger of addiction to its use, in a chronic disease like tabes, must always be kept in mind; it is important to withhold knowledge of its use from the patient. Paresthesia, which may become quite disconcerting at times, should be treated along the same lines as pain; in addition light cauterization along the spine, repeated at frequent intervals if necessary, has proved of great value.

*Bladder Disturbances.*—These occur in about 80 per cent. of the cases. At first, dysuria, hyperesthesia of the neck of the bladder, followed by frequent micturition, dribbling, and various degrees of retention. Strychnine and ergot in small doses are of value in toning up the bladder wall. Of utmost importance is the training derived from emptying the bladder at regular intervals, at least once in every four hours. Where there is marked retention, and cystitis, due to the decomposition of urine, has set in, hexamethylenamine, and bladder irrigations with a mild antiseptic solution is indicated. The danger to which these patients are exposed through infection along the urinary tract must not be underestimated, if disastrous complications are to be avoided. The catheter, if it becomes necessary, should be used under strictest aseptic precautions, and never by an unskilled assistant or the patient himself.

*Ataxia.*—A symptom so prominent in the disease that it justifies the term 'locomotor ataxia,' is present in about 75 per cent. of the cases; in nine-tenths of these, it appears insidiously in the lower extremities. There is usually no loss of muscle power, although tiredness of the limbs may be one of the earliest symptoms noticed by the patient. He then finds that he has become a little unsteady on his legs; that he walks as though he were intoxicated; his legs give way under him. He has great difficulty in negotiating stairs and curbs; he stumbles easily, especially in the dark, and has to watch his movements continuously; he becomes readily frightened when he has to cross a street where there is much traffic; and finds that he has lost his sense of position and sways when his eyes are closed.

This most alarming condition of affairs, progressively grows worse, until every change of position becomes an ordeal much dreaded by these patients, and the well-known classical ataxia of this disease has fully developed. The treatment of this most distressing symptom is indeed an important problem in the care of these patients.

Frenkel,<sup>6</sup> of Heiden, in 1897, elaborated a system of exercises, so designed as to reeducate the ataxic muscles; these exercises depend upon the reeducation of muscle groups and the extremity as a whole by graded coordinated movements. The patient is trained at first to stand and to use his eyesight to compensate for the loss of his joint and muscle sense. Simple training movements are then

added, such as touching with the toe, a figure marked upon the floor; later, walking movements in which the patient attempts to follow accurately a series of footprints, marked at various distances upon the floor. As the patient improves, more complicated walking movements are devised: snake-like course, turning, etc. Finally walking up and down stairs is taught. With this method of re-education, there are few patients who do not improve to some extent; a few improve to a degree that permits unaided walking in public; complete failure is exceptional, but relapses are common.

Maloney,<sup>5</sup> in 1913, described a method of reeducation which he had elaborated and which contained a number of important features for the successful treatment of ataxia. His method is based on, first, the teaching of coordinated movements blindfolded; second, the correction of the mechanical defects usually found in all tabetic feet; third, the treatment and elimination of the psychic components of ataxia, the principal one of which is fear.

The results that I have obtained with this reeducation method have been gratifying, indeed. In two papers that have recently been published,<sup>7,8</sup> I have described some of the cases and the results obtained.

The following is a description of the application of Maloney's method. (a) Mechanical measures; these consist of plates, shoes, and knee-caps, by means of which we endeavor to correct any mechanical disabilities present. A cast of the foot at rest and when bearing the body weight is taken, and a suitable plate to correct defects of the arches is constructed therefrom. The type of plate used is a modification of the Whitman plate; the inner lip being curved below the level of the scaphoid; the outer flange is lower and does not extend so far forwards; and the support of the transverse arch extends outwards beneath the four inner toes. When the spread is great, the inner lip extends forward to include the metatarsophalangeal joint, surrounding it completely on the inner side.

A high shoe, especially strengthened on the outer side of the ankle, increases the support of the ankle and prevents the foot from turning in. The heel is low and wedge-shaped, with the base of the wedge being on the ground, and is continued along the outer side of the shoe. A welt, as broad as the patient will permit (usually about a quarter of an inch), projects. A wooden shank is placed in the sole to prevent bending. The shoe should be as light as is consistent with maintaining its shape. When the shoe is on the ground, it rests on its whole bearing surface. The patient gets support from this broadened surface simultaneously. He does not oscillate every time he puts his foot down. He feels more secure; he is really more secure. He is readily weaned from the straddle-legged attitude, which is so disconcerting to coordinated walking. The occasional giving at the knees has a very demoralizing effect upon the ataxics.

To avoid this giving, the knees should be lightly supported by an elastic bandage.

*Educational Exercises.*—These are divided into

1. Breathing and relaxation.
2. Co-ordinated movements.
3. Balancing.

#### BREATHING AND RELAXATION.

A quiet room, preferably darkened is required, a bed or couch, wide enough to keep patient's arms from hanging over the side when relaxed and a small cushion for the patient's head. The bed should be high, so that the operator can manipulate comfortably. The patient, blindfolded, is placed in a recumbent position, the clothes about his chest and abdomen being loosened. He is then directed to inspire deeply, using his diaphragm and restricting his thoracic movements; at the height of inspiration he is asked to pause, then slowly and evenly to expire to the fullest extent and again pause. His mind should be free from any distracting influence, and his attention must be kept on the sensation of the current of air passing through his nasal cavities. A small sandbag placed upon the abdomen will help to fix his attention on the exercise. After six or eight deep breaths have been taken, the patient is asked to take about the same number not quite so deep, and to shorten the pause at both inspiration and expiration. After this, medium breathing is mastered, the depth of the respirations is further decreased, and the pause is shortened until the patient is breathing quietly and regularly as if asleep.

*Relaxation.*—To relax the muscles, passive movements in which the muscles are alternately lengthened and shortened are employed. The muscles of the scalp, forehead, eyelids, cheek and jaw are first passively moved until wrinkling and blinking of the eyelids diminish and disappear and muscular spasm is reduced or eliminated. Next the shoulder is relaxed, then an arm, each in turn must be passively moved until all traces of muscular tension vanish and the part lies motionless and flaccid, and falls limply from any unsupported position. After a part is relaxed, those previously and that newly, relaxation should be briefly dealt with again in the order in which they were first relaxed; this linking of parts previously to parts newly relaxed is helpful in bringing the whole to a satisfactory state of relaxation.

The lower extremity on the same side is next dealt with. The trunk may be relaxed with the patient sitting in a chair, the muscles being moved from side to side. The whole process is conducted slowly and with suitable pauses. From these relaxation exercises, practised blindfolded, three results are obtained. First, ineffective, often useless and sometimes completely disconcerting muscular



contractions which have been acquired in attempts to balance are eliminated, so that the coordinating exercises can be begun on an unconstrained musculature and not superimposed upon existing habit contractions. Second, active relaxation confers a great training in attending to muscular sense impressions. Third, the patient becomes less fearful and more receptive, because in so far as fear is maintained by its motor expressions in his attitude, it is diminished.

Movements are next begun. Passive flexion and extension of the ankle are first practiced. The foot is placed in extreme flexion, and the patient is instructed to count slowly while the physician, at a uniform rate, moves the foot to a position of complete extension. The purpose of the passive movements is to teach the correct direction and extent of each movement.

Next the patient lightly but steadily resists the passive movement. Then the movement is practiced, with the patient performing and the physician aiding and guiding. The physician's aid is gradually lessened as improvement occurs, and then the movement is executed by the patient alone; finally, the movement is made against resistance. It is essential that the movement should always be completed by the return of the limb to the position from which the movement started. During every movement the patient counts rhythmically. The purpose of the counting is to educate the patient to move easily and uniformly, and at a regular tempo. After the ankle, first the knee, then the hip of the same limb are educated. Besides flexion and extension, all the simple movements which can take place at the joint are practiced. All exercises are done without shoes; artificial aid should not be employed during the exercises. In every case, first breathing and relaxation, next passive, then passive resistance, then passive combined with active, then active unaided, and finally active resisted movements are practiced.

When the ankle movements have been acquired, then movement exercises are begun with the knee; when the knee movements have also been acquired, then ankle and knee movements are repeated before each attempt at hip movement, etc.

The repetition, after relaxation exercises, of a movement which can be proficiently performed, is a great aid in the learning of the next movement. The limb movements which are practiced in the recumbent posture may also, if possible, be practiced as occasion permits in the sitting posture. From the right lower limb we proceed to the left, breathing and relaxation; passive, resisted passive, combined passive and active, active and active resisted movements at each point are practiced, as before. Before any attempt is made to teach progression, the trunk muscles must first be coordinated by relaxation and movement. This is usually easy, for the upper limbs being seldom ataxic may be used to practice lateral and forward

thrusts, elevation to a sitting and resumption of the recumbent posture, with aid and against resistance. The head and neck muscles are similarly treated. Their treatment is just as important as that of any other part. The position of the head largely governs the attitude of the body. Too great stress cannot be laid on this preliminary training and attitude. The whole body must be taught to move harmoniously.

The first essential of stability in walking is stability at rest. After the exercises in recumbent and sitting postures are completed, the first attempt at progression is made. Knee-caps similar to those used by carpenters, but well padded, are tied on the knees and the patient is instructed in creeping. The change from recumbent to creeping posture does not unduly strain the patient's confidence in his powers of unaided blindfolded progression. The creeping movements are conducted with the back as horizontal as possible; squatting must be permitted. The tempo of the movement is again carefully regulated by counting. The direction is insured by means of a strip of carpet or linoleum upon which the creeping is performed.

After creeping has been practiced for some time, first, changing from creeping posture to kneeling up, then rising from the sitting posture to the upright, are attempted. In the erect kneeling posture, progression is practiced. Progression in the creeping and kneeling postures trains a person to move his body automatically with his lower limbs.

This training is invaluable as an aid to walking. Finally walking it taught. To maintain direction during blindfolded walking, strips of carpet or linoleum are again used.

These strips may be arranged parallel with the walls of the room, so that the patient may at first feel his way. As he becomes more proficient, narrower strips are used until he is able to progress on a strip five inches wide. Relaxation should be as zealously practiced as are the movements, as in the beginning the education of muscular sense impressions must come mainly through these exercises reinforced by blindfolding and passive movement. The patient should be exhorted not only to relax daily at definite periods, but also to avail himself of every opportunity of relaxation. Every movement must be performed without strain. When during the exercises the performance is unsatisfactory, the indication is relaxation. At no time should the patient be allowed to become fatigued.

Fear among the psychic symptoms manifested by the tabetic is so constant and important that it merits special consideration. *Tabes*, as we know, is a disease associated with lightning pains, neuralgias, crises, bladder trouble, impotence, diplopia, optic atrophy, commencing deafness and above all ataxia; this group of symptoms has a tremendous influence in establishing and perpetuating a state of

anxiety, of mental stress and of fear. The many perils to which an ambulatory tabetic is daily exposed, tend to become more and more harassing. Fear complexes readily form, which, as they become more elaborated, tend to succeed one another and to produce an unrelieved state of perturbation.

The attitude of a typical ataxic tabetic is partly a motor expression of his fear. His broad base when standing or walking, his constant use of his stick, his gaze fixed on the ground, are all partly fear effects. His fear increases on the slightest provocation and, as he dreads, his ataxia increases. At first he fears all he sees, then he begins to fear what he cannot see.

*Treatment of Fear.*—The modified shoes and the slight bandaging have a very important tranquilizing effect. The blindfolding, the relaxation exercises, the careful graduation of the movements, all encourage. The removal of the ataxia is itself a treatment of fear. The correction of attitude also mitigates fear. An erect man cannot easily be terror stricken. For the immediate combating of fear it is valuable to explain to the patient the origin of his fears, to teach him to analyze a fear as soon as it arises, and to subdue it.

Deep breathing is his best weapon for this purpose. So long as he breathes deeply, he cannot become much afraid. The James Lange theory—that the fear is caused by the visceral changes and not the visceral changes—quickened heart and respiration rate, etc., by the fear, may not be wholly true, but if a person breathes deeply and thus keeps his heart's action from becoming unduly fast, he cannot develop any great degree of terror.

Of great importance is the general nutrition of the patient. He should remain out of doors as much as possible, and practice mild exercises; at the same time being exceedingly careful to avoid fatigue. His diet should be liberal and contain an abundance of fat in the form of butter and olive oil. As a general tonic, I have found bi-weekly injections of the cacodylate of soda, in one and one-half grain doses, to be of great value. The different crises should be treated along general lines, rest in bed, and in severe attacks resort must be made to opium or some of its derivatives.

#### CONCLUSIONS.

With the means as here outlined at our disposal, there is surely no logical reason for the abandonment of this class of patients to their own devices, or into the hands of faith healers, quacks and other forms of irregular practitioners. Of utmost importance is the psychic treatment; no patients are more liable to general dependency, to marked hypochondriasis, than are those suffering from locomotor ataxia. They should, therefore, be given every possible consideration, should be encouraged in every way, and should be told that in spite of having an incurable disease, the



symptoms may remain stationary for a long period of time, and that life can be made tolerably comfortable in spite of their disease.

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ZIEHEN'S CONCEPTION OF THE PSYCHOPATHOLOGY OF  
THE DISTURBANCES OF PERCEPTION.

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Perception is the first step in the psychic process. Normally perception arises directly from an external stimulus which acts upon the terminal distribution of any sensory or sensorial nerve. In rare cases, a stimulus acting upon a peripheral nerve tract also induces a perception. For instance, a blow, or pressure upon the ulnar nerve at the elbow, produces a peculiar perception throughout the whole area of distribution of the nerve.

Every perception has five principle characteristics. The first is the quality of the perception; the perceptions of the tone C, of red and of sweet, etc., are collectively more or less different qualitatively.

A second characteristic of every perception is its intensity. I can hear the same tone C loudly or faintly. If I moisten my tongue with an increasing concentration of a solution of sugar, the intensity of the perception also increases without altering its quality.

A third characteristic of every perception is the tone of feeling. Every perception is accompanied by a greater or less degree of pleasant or unpleasant feeling. For instance, the perception of the accord C-C is accompanied by a distinctly unpleasant or negative tone of feeling, while the perception of the accord C-E is accompanied by an extremely pleasant or positive tone of feeling.

Fourthly, to every perception there is a spacial characteristic, inasmuch as every perception is projected at a definite point in space. This spacial localization attains quite a special significance in the sense of vision and in the sense of touch, in that the excitations coming from the adjoining points of the skin and of the retina, become localized in the field of perception (field of vision) in the same spacial arrangement.

The last characteristic of the perception is its duration. It is the custom to designate the five just presented perceptions by saying that to P are attached the indices q. i. t. s. d. The perception with all its characteristics can also be designated as Pqitsd. First we will discuss the disturbances of the intensity of perception.

(a) *Disturbances of the Intensity of Perception.*—The intensity of a perception in a healthy individual depends upon the intensity of the stimulus which produces the perception according to definite

well-defined laws. The most important of these laws to be considered are as follows:—

1. The stimulus must have a definite strength in order to induce a perception, or in other words, there are imperceptible stimuli, *i. e.*, stimuli that are too weak to produce a perception. That strength of a stimulus which suffices to induce a perception is designated as a stimulus-threshold. For every quality of perception, there exists a quite definite stimulus-threshold.

2. If the stimulus grows beyond the stimulus-threshold, the intensity of the perception at first increases very rapidly and then more and more slowly.

3. If the stimulus has reached a certain strength, the so-called stimulus-height, a further increase of stimulus leads to no further increase of the intensity of perception, but the latter remains at that height which corresponds to the stimulus-height.

The simplest proof for the correctness of these laws is vouched for, for example, by the observation of a sound which we gradually intensify. At first, we hear nothing of the sound, although, as physics teaches, the sound waves impinge upon our ears. The stimulus is still too weak to induce a perception. It is found below the stimulus-threshold. Only when we have brought the sound to a definite intensity corresponding to the stimulus-threshold, do we begin to hear the sound. With a further intensification of the sound, the intensity of perception increases very rapidly at first, and then always more slowly. If finally, we have reached a very high intensity of sound, we reach a point where we are no more able to increase the perception intensity, by a further increase of sound-loudness. The sound has become so loud and shrill that a further increase does not take place: The stimulus-height has been reached, the perception does not increase any more. It has been tried by the most variable methods to express this peculiar behavior of the perception-intensity on increasing the stimulus-strength, by a definite mathematical formula. The best known is the so-called Fechner's formula. This reads  $P_i \propto S$ , where  $P_i$  designates the perception intensity, and  $S$  stimulus-strength.

Since these formulæ including Fechner's, one and all have frequently proved, unreliable, and accordingly are without significance for pathology, we differentiate provisionally only two main disturbances of perception-intensity, the hypesthesias and anesthasias, and the hyperesthesias.

By hypesthesia is meant a decrease in susceptibility. This manifests itself in that the stimulus-threshold lies very high, and the perception intensity  $P_i$ , in proportion to the stimulus, is very weak. If the highest stimulus-strength is not in the position to induce a perception, one applies the term anesthesia or obliteration of sensibility.



The majority of hypesthesias and anesthetics, which we observe in the insane, depend upon complications of the psychosis.

Of such complications, the following are the most frequent:—

1. *The tactile hypesthesias and anesthetics of hysteria.* In the fields of the sense of touch, these are characterized by their peculiar localization—namely, either the hypesthesia limits itself to one-half of the body (hemianesthesia or hemihypesthesia) or it limits itself to ‘regions’ according to the natural concepts of our body-parts (hand, arm, etc.). Less frequently, individual hypesthetic or anesthetic places are found. Very rarely there is a hypesthesia or anesthesia of the whole superficial surface of the body. Not infrequently, the remaining sensory nerves also participate in these hypesthesias (concentric narrowing of the field of vision, unilateral and bilateral ageusia and anosmia, etc.). The otherwise rare unilateral hypesthesias and minor chorea now and then also occasionally complicate the psychosis.

2. *The diffuse tactile hypesthesias of multiple neuritis but corresponding to the anatomical distribution of definite nerves.* But multiple neuritis at times also arises with a psychosis, especially after acute infectious diseases, in syphilis, in alcoholism, in diabetes, and at times also in senility.

3. *The tactile hypesthesias and anesthetics of tabes and other spinal diseases.* Tabes is very frequently complicated with psychoses, most frequently with dementia paralytica, and then adds its hypesthesias and anesthetics to the symptoms of the psychosis. Besides the disturbances of tactile sensibility, and of temperature and of muscle sense, there comes into consideration, the visual disturbances due to tabetic optic nerve atrophy, as well as the less frequent auditory disturbances due to tabetic atrophy of the acoustic nerve.

4. *The sensory and sensorial manifestations of destruction in consequence of a focal disease at any point along the course of a sensory and sensorial tract.* Every focal disease of the brain may occasionally induce a psychosis, *e. g.*, by indirect action upon the organ of the mind, the brain cortex. The latter then appears complicated with the sensory or sensorial hypesthesias of the focal disease. This particularly applies also to the multiple focal diseases, *e. g.*, multiple sclerosis, multiple thrombosis, gummatous cerebro-spinal syphilis, etc.

All these just-presented hypesthesias and anesthetics are more incidental complications of the psychosis than symptoms of the psychosis itself. Whether besides such complication hypesthesias, also essential hypesthesias occur, brought about by the psychosis as such, is doubtful. In those psychoses like catatonic stupor, melancholia, and many forms of so-called amentia, in which essential hypesthesias could at first be expected, an exact determination

of the stimulus-threshold and estimation of perception-intensity are scarcely possible, because of the morbid behavior of the patient. If such hypesthesias, which have also been designated as psychical, should actually exist, they are diagnostically without significance; at any rate at first.

The hyperesthesias, at first, are frequently only symptoms of complicating neuroses. Thus, *e. g.*, the hemihyperesthesia or the regional hyperesthesia of hysteria may be superimposed upon the pure psychical symptoms in the psychosis. In a particularly close relationship to the psychosis itself stands the hyperesthesia of patients with the neurasthenic psychopathic constitution. By a neurasthenic, a feeble ray of light is perceived, at times, as blinding. He perceives odors which the healthy individual does not perceive on account of their feeble intensity. Here, as a matter of fact, the stimulus-threshold appears pathologically lowered.

Besides neurasthenia, there are numerous other conditions which manifest hyperesthesia, tactile as well as optical (hyperesthesia of the retina), and acoustic hyperesthesia (oxyakoa). Such hyperesthesias are very frequently manifested especially by juvenile patients. Furthermore, the prodromal stages of many psychoses, *e. g.*, mania and acute paranoia forms, are often accompanied by hyperesthesias of this or that sensory area. Also convalescence (*e. g.*, from mania) may manifest hyperesthesias. Almost without exception, this hyperesthesia is particularly well marked at definite points of the body surface on deep pressure. Such points are designated as pressure-points (Valleix's points). They correspond, in some cases to definite nerve trunks, *e. g.*, the supra-orbital, infraorbital, and mental point. In other cases we are not yet able to explain with certainty the localization, as in the case of the temporal point over the zygomatic process, the iliac point, whose pressure sensibility in the female sex is falsely designated as ovarian, the intercostal point, the spinous processes of the vertebræ, the cranial sutures, the mammary point, etc. In the description of the hyperalgesias, these pressure points will again be referred to. Such pressure points will also be found, at times, directly over the anesthetic areas, *e. g.*, in hysteria. The heightening of the cutaneous reflexes furnishes, in many cases, a noteworthy objective sign of the hyperesthesia under consideration.

(b) *Disturbances of the Tone of Feeling of the Perception.*—By the tone of feeling of the perception is understood, as above mentioned, the pleasant or unpleasant feeling accompanying the perception. The pleasurable feeling is also designated as positive, the unpleasurable as negative feeling-tone. The tone of feeling, and the intensity of the same depends: First, quite essentially upon the quality of the perception, and accordingly also upon the quality of the stimulus. The accord C-C generates a perception with

a negative tone of feeling, or as we generally say, we perceive it as a dissonant. The accord C-D generates a perception with a weaker tone of feeling. The accord C-F is accompanied by a distinct pleasurable feeling, *i. e.*, positive tone of feeling, the accord C-E by a much stronger pleasurable feeling, etc. This dependence of the tone of feeling of the perception upon the quality of the perception is seldom disturbed in the psychosis. Only occasionally does one find, especially in hysterical psychoses, a reversal of the tone of feeling, *e. g.*, in consequence of which, dissonants are perceived as pleasant and consonants as unpleasant, disagreeable odors as pleasant, agreeable as unpleasant, etc. These disturbances may be designated as paralgesias or parhedonias. The so-called 'morbid appetites' in the mild psychopathic conditions of many pregnant individuals in part belong to this group. Especially important are also the parhedonias in the field of sexual perception. They especially manifest themselves in the fact that not the associations with persons of the opposite sex but associations with persons of the same sex, call forth sexual perceptions with a positive tone of feeling, *i. e.*, a feeling of sexual pleasure. These abnormalities are also designated as contrary or homosexual perceptions, or better, a contrary sexual feeling.

Much more significant for psychopathology than this dependence of the tone of feeling upon the quality of the perception is the dependence of the tone of feeling upon the perception-intensity. For the mentally healthy, the following rule here holds good. Every perception with a weak intensity (*i. e.*, in the neighborhood of the stimulus-threshold), is associated with a positive tone of feeling. The more the perception-intensity increases, the stronger at first becomes this positive tone of feeling. Only when the perception-intensity has reached a certain height, a turning point in the affect-curve sets in: The positive tone of feeling progressively decreases and sinks to zero at the perception-intensity and the stimulus-intensity. If the stimulus-strength and the perception-intensity still further increase, an increasing negative tone of feeling sets in.

Daily experiences verify the correctness of the just presented law. Nauseating substances, as the perfume manufactories, by sufficient dilution, become pleasant odors, and a very concentrated solution of sugar produces a well-marked disagreeable feeling. This law holds good for all perception qualities. A too intense light acts 'blindingly,' an over loud sound is perceived as 'shrill,' and an intense touch is 'painful.' Pain, accordingly, is the negative tone of feeling which accompanies very intense perception. Independently of this, however, we designate many qualities of a perception, *e. g.*, certain odors, in general, either as pleasant or unpleasant.

The pathological disturbances of the strength of the tone of feeling of the perceptions are divided into hypalgesias and hyper-



alglesias, hyphedonias and hyperhedonias according as the negative or positive tones of feeling are decreased or increased.

By hypalgesia is meant a diminution of the negative tone of feeling of a perception. Its highest degree is analgesia or abolition of the negative tones of feeling of a perception. Only the hypalgesias and analgesias of the tactile perceptibility possess practical significance, *i. e.*, the diminution of the so-called pain sensibility in the narrower sense. The hypalgesias and analgesias which we meet in mental disturbances like the hypesthesias, frequently depend upon the complication of the psychosis. Thus, *e. g.*, the unilateral or general analgesia in hysterical psychoses is more a symptom of the hysterical neuroses than of the psychosis itself, for the analgesia generally exist in these patients, both before the onset and after the subsidence of the superimposed mental disturbance, entirely in the same way. The same, *e. g.*, holds good also for the tabetic hypalgesias and analgesias, etc.

A closer connection of the hypalgesia with the psychosis itself exists especially in the following cases:—

1. In congenital mental-weakness.
2. In many cases of acquired mental-weakness. Thus the abolition of pain-perceptibility is especially a very clear characteristic and frequent symptom of the already many times mentioned dementia paralytica. In these patients the most intense cutaneous stimuli can often be applied, *e. g.*, a testing needle thrust up to its head, without the patient perceiving more than a slight touch.
3. In severe so-called dazed conditions, that is, the peculiar conditions arising periodically in which there is a severe disturbance in the connection of thought and action associated with a high degree of disorientation. Such dazed conditions are observed most frequently in epileptics, and in these cases they are almost always accompanied by an almost complete analgesia of the whole body surface.

The above-mentioned hyperesthesia is very frequently also combined with hyperalgesia, *i. e.*, not only is the intensity of the perception increased in a pathological manner, but the negative tone of feeling is also pathologically intensified. The occurrence of hyperalgesia in psychoses, therefore, just about corresponds with that of hyperesthesia. Sensory or sensorial hyperalgesias are most frequent in hysterical and neurasthenic psychopathic constitutions as well as in psychoses of juvenile individuals. Accordingly the above-mentioned pressure-points are especially sensitive to pressure, at times to such an extent that the patients cry out loudly.

The hunger pain of many insane, which leads to a ravenous hunger (bulimia), also belongs here. Generally an absolute failure of the feeling of hunger-satisfaction combines itself with this, especially in hysterical psychoses.

Hyphedonia or pathological diminution of the positive tones of

feeling of perception is decidedly less frequent than hypalgesia. Where it arises, it almost always is a symptom of the psychosis itself. Its greatest significance is in the field of sexual perception. Here, at times, a complete anhedonia occurs in certain mental disturbances, in that the so-called voluptuous feeling, *i. e.*, the positive tones of feeling of sexual perceptions completely fail. Especially upon the basis of a severe hereditary taint, such sexual anhedonia (frigidity) not infrequently develops. With the homosexual, contrary sexual feeling, there is almost always an anhedonia towards the opposite sex. At times it is also a symptom of severe organic diseases of the central nervous system, *e. g.*, tabes or dementia paralytica. Many chronic intoxications (alcohol, morphine, cocaine), also frequently occasion a pathological sexual anhedonia or hyphedonia.

In the field of hunger perceptions, hyphedonia in psychoses also often plays a decided rôle. It leads to a psychically induced loss of appetite or anorexia. The latter may be so decided as to lead to complete refusal of food.

Pathological increases of the positive tones of feeling of perception are designated as hyperhedonias. Such again are most frequent in the field of sexual perception (satyriasis in the man, nymphomania in the woman). Hyperhedonia here as a rule manifests itself in the fact, that immediately after the sexual gratification, the sexual desire is again awakened and indeed frequently intensified. Other pure hyperhedonias are rare.

With the just enumerated hypalgesias and hyperalgesias, hyphedonias and hyperhedonias, the disturbances of the strength of the feeling tone of the perception are not yet exhausted. Besides the tone of feeling, which accompanies the perceptions themselves quite independent of the concepts resulting, is the perception in conjunction with the concept. Concepts joined to a perception also transfer their tone of feeling to the perception. Thus, for example, a landscape, in spite of the limited beauty of its outline and colors, excites pleasant feelings in consequence of the concepts, *e. g.*, the pleasant recollections which join themselves to this. The procedure here is apparently the following: At a certain spot, I have had a pleasant experience, *i. e.*, perceptions with strong positive tones of feeling, *e. g.*, found a friend. From the locality as well as from the meeting of a friend, there remain behind in me memory-pictures. The memory-picture of the landscape is at first not accompanied by a positive tone of feeling, but only on account of the memory-picture of the friend. But when the seeing of landscape, and meeting of the friend occur simultaneously, the positive tone of feeling of the latter also transfers itself to the memory-picture of the landscape. This is designated as the irradiation of the feeling-tones. The result of this irradiation is that when I see this

landscape a second time, this visual perception of the landscape is accompanied by a distinctive positive tone of feeling. This tone of feeling, which the perception owes only to its associated concepts, is also designated as 'reflected or secondary tone of feeling of the perception.' These reflected tones of feeling play an important rôle in psychic pathology. In many psychoses there arises especially a morbid predominance either of the positive or of the negative tones of feeling of the concepts. Thus we recognize a morbid dejected mood or depression (*e. g.*, in so-called melancholia) and a morbid exalted mood or hyperthymia (*e. g.*, in so-called mania). The pathological moods in the domain of the imaginative life are here also imparted reflexly to the tones of feeling of the perception, and thus arise reflected secondary pleasurable or unpleasurable feelings of the perception. The melancholiac, *e. g.*, feels indeed the harmony of the consonants just as well as the disharmony of the dissonants; the primary tones of feeling of the perceptions are, as a rule, not at all altered, but the harmony of the consonants creates no pleasure in him because of the general negative toning of feeling of the imaginative life. Either he is indifferent (the patient says 'the heart is as if turned to stone'), or he perceives the harmony as painful. The maniac, on the other hand, feels the dissonants still as disharmony, the prick still as pain, but the general toning of feeling deceives him in regard to disharmony and pain. A young female maniac with a carious tooth stated laughingly, in a very characteristic manner, about her "divine toothache."

(c) *Qualitative Changes or Disturbances in the Content of the Perception.*—The quality of a normal perception is determined by the peripheral stimulus upon the peripheral nerve distribution. A stimulus S acts and generates in the peripheral nerve distribution an excitation which we designate as Sp. This excitation is transmitted to the brain cortex and there induces an excitation Sc. The excitation Sc corresponds to the perception P. Generally Sc corresponds to S qualitatively and in so far the perception P furnishes a true picture of the stimulus S. Only when an inadequate stimulus acts upon the peripheral nerve-distribution does Sc deviate from S, and then also P does not correspond to S in content. Thus, *e. g.*, the ether vibrations of light and the sound vibrations of the atmospheric molecules are the adequate stimuli for the optic and auditory nerves respectively. If we permit an inadequate stimulus to act upon the optic or auditory nerves, either an electrical or mechanical stimulus, a perception of light or sound also arises. If, for example, we press upon the side of the eye-ball and so pull upon the optic nerve, ending in the retina, we see a bright ring of light. Likewise, a galvanic stimulation of the optic nerve produces a perception of light, and a galvanic stimulation of the auditory nerve produces a perception of sound. Here Sc evidently does not correspond to S,



the mechanical and electrical stimulus undergoes a transformation in the brain cortex according to the law of specific energy of the sensory nerves, the effect of the mechanical and electrical stimulus is perceived as light or sound. The perception P stimulates in us S which is not at all present. This qualitative falsification of the perception in the sense of the law of specific energy at times also plays a rôle in pathological cases. The mechanical pressure-stimulus of a swelling which involves the central or peripheral tract of the olfactory, or the acoustic nerve, etc., can generate 'subjective' perceptions of smell or of hearing. These subjective perceptions caused by inadequate stimuli are distinguished in the mentally-sound by very elementary simple conditions. Generally there are simple flashes of light or ringing of chimes, etc. In the field of tactile sense, paresthesias and pain arise in an analogous manner, but these are less noticeable to us, because the stimulus (pressure of a swelling) here is an adequate one, *i. e.*, corresponds to the sensory area.

In the insane, the qualitative disturbances in relation between P and S are more manifold and more complicated. Three forms of such qualitative disturbances of perception are differentiated as follow:—

1. Secondary sensory-perceptions or synesthesias: In these, a stimulus S induces a perception P corresponding to it in a normal manner. To this perception, however, a second perception from another sensory area is superadded, without any further corresponding stimulus.

2. Hallucinations: S is entirely wanting and, in spite of a perception, P arises.

3. Illusions: S is present and only produces a perception from the corresponding sensory area, but this perception corresponds only in part to the causative stimulus S. It is transformed from the normal perception. Synesthesias, hallucinations, and illusions may also be included under the general term 'sensory deceptions.'

## MULTIPLE LIPOMATOSIS.

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## INTRODUCTION.

I propose in this paper to describe two cases of multiple lipomatosis, using this term for the present as a matter of convenience with the idea of establishing, if possible, a new clinical type and for the purpose likewise of dissociating this type from the generic term *adiposis dolorosa*.

In order to do this it will be essential to analyze the literature with some care in order to see first whether similar cases have been described, and second, if they have been, is their relation to Dercum's disease close enough to warrant their inclusion as a sub type.

Three things are evidently necessary before a new clinical entity may be said to exist. First, an accurate clinical description to serve the purpose of identification for subsequent observations. Second, a study of the literature to exclude previous descriptions of similar or like types. Third, autopsy findings sufficient at least to furnish some kind of anatomical ground for the production of symptoms and specific changes found in this disease and none other.

It is obvious, as both of these cases are still alive, that I can carry out only two of these essentials, leaving for the future the third one.

I am perfectly aware that two cases are not sufficient to establish a separate type of disease, but I am comforted with the thought that Dercum began with only one and that by calling the subject to your attention so early in its history some of you in the course of the year may help me out by more cases, or, what is more likely, may shatter by your criticism and comments the idea of a new disease at all.

Case I has had the advantage of a longer period of observation, about eight years, and has been more constantly and carefully studied and in addition has had two periods of hospital observation at the Washington University Hospital and at the Barnes.

Case II was a patient in the Barnes Hospital under the care of Dr. Canby Robinson, who asked me to see this case for its neurological symptoms, and in the course of studying it from this point of view the lipomata became for me the chief object of interest.

The 2 cases are remarkably similar, and therefore only one will be described in detail.

CASE I.—This man was first seen January 22nd, 1907. He was at that time forty-one years of age and a switchman by trade. His complaint then was pain around the heart a few days before, during which he fainted falling to the floor, chiefly on account of weakness. Ever since the death of his only child at that time, two years ago, he had felt depressed and discouraged. The pains around the heart had extended to the arms, hands, legs, etc. Felt weak and unable to work except a few days at a time and that very irregular. He had been married six years and had one child two years old, who died as has been said of scarlet fever. One brother has tabes dorsalis. Sister in good health. Father died with cancer. Mother living and in good health. Patient is a moderate user of tobacco, seldom drinks. No important previous illness with the exception of an attack of measles when twenty-one years of age.

Physical examination made at that time showed no anomalies in his nervous system. Reflexes all present and equal. Pupils react normally to light and accommodation, were not irregular and of normal size. The urinary examination was perfectly normal. A note on the heart is as follows: First sound is hypertrophic at the apex. Apex beat is diffused over an area of three fingers breadth. The second sound at the apex is very faint and markedly differentiated from the first. At times it is all but obscured by the intensity of the first sound. At the base the second is apparently normal though the difference between the first and second seemed somewhat unusual. There was at this time no increase in the heart area and no murmurs. Pulse around 78 and regular.

This patient was seen in the course of the next eight years at varying periods of time. Some times regularly and some times months would elapse before he presented himself for advice. During all these years, however, the pain and discomfort around the heart was more or less present. It seemed to be independent of exertion and only made itself manifest at times of depression and discouragement and inability to work. A number of consultations with internists were held during this period to determine just what the condition of the heart was. An x-ray picture was taken and all that was discovered was a slight enlargement on the left. No evidence of any enlargement of the aorta.

Up to two years ago patient managed to keep on with his work as a brakeman with occasional periods of idleness on account of disability. Gradually it was seen that the patient became less and less able to work. There were periods of marked discouragement and depression, some headache from time to time, and a great decrease in his ability to perform his work. He would easily tire and had a curious heavy feeling in his legs and back, complained of feeling sleepy, tired, indifferent, and uninterested. This became so marked that his periods of employment were less and less regular and as a consequence his earning capacity gradually diminished.

About eighteen months or two years ago he first noticed a number of nodules, or lumps as he called them, over various parts of his body. These were not painful at first and he paid little attention to them. Gradually it began to dawn upon him that these lumps had something to do with his symptoms. He went to the Jewish Hospital where one of them was incised and it showed macroscopically evidence of fat and a diagnosis was made of fatty tumor. This occurred during a period when I was out of town and I have no further data on this examination.

He was sent to the Washington University Hospital in 1914, remaining there a few days, where several of the tumors were removed and were stained showing practically pure fat. During this period at the Washington University Hospital his blood-pressure was found to be 130 systolic, sugar tolerance 200



drams of glucose. No further tests were made then, the general physical findings remaining just as they were at the previous examination.

He was again admitted to the Barnes Hospital about a week ago, and the data herein given are the results of our examinations there.

A résumé of the present illness shows that nine years he first began to feel weak, drowsy, listless, sleepy, with a tendency to sleep sometimes for half a day. The attacks of weakness that were described in the preliminary history were found to be of very frequent occurrence in the past history of this patient and were sometimes preceded by a feeling as though the floor and ceiling were going to meet. As far as can be gathered he never lost consciousness, never fell down. At times he would become very dizzy, describing the sensation as a swarm of bees in his head. Throughout these nine years the main trouble was nervousness, drowsiness, listlessness, buzzing in head, faint feeling, and at times pains in the chest and the region of the heart as has been referred to. The last few years there have been periods of only a few weeks when he has felt fairly well. He feels frequently as though he were about to die and becomes very despondent, completely incapacitated, drowsy, and utterly without energy and activity, perfectly willing to sit still for hours at a time.

Physical examination shows well nourished man lying quietly in bed. Sensory examination normal. The skin is warm, elastic, thick muscles of good size and fair tone. No glandular enlargements. Head symmetrical, with slight greying of hair. No elevations or depressions, no mastoid tenderness, hearing slightly impaired in both ears. Nose negative. Tonsil not enlarged, teeth in good condition. Pharynx shows slight hyperemia. Eyes are normal, pupils react to light and accommodation and consensually, promptly and actively. There is no unusual pigmentation. Ocular movements are perfectly normal. Some palpable glands on post cervical region on left. Thyroid just palpable. No abnormal pulsations or sounds heard. Percussion of the chest is resonant, both sounds vesicular throughout the lungs. No unusual dullness, no rals or abnormal sounds. The heart shows slight enlargement to the left, apex beat in the 5th interspace, somewhat outside the usual line. The first sound is clear and loud, suggesting a hypertrophic ventricle, no murmurs, no shocks, no thrills. The first sound is felt 12 cm. from the mid-sternal line in the 5th interspace. Slightly plus pulse. Aortic tones perfectly clear.

Abdomen: Abdominal walls thick. Slight umbilicus hernia. No masses, points of tenderness, dull areas. Liver edge cannot be felt nor is spleen palpable. Rectal examination shows prostate slightly tender with the left lateral lobe enlarged. No other findings. Genitals are normal in every way.

Examination of the nervous system reveals perfectly normal findings, with possible lowered Achilles and knee-jerks on both sides. They can be obtained but with some difficulty. No abnormal toe phenomena, and no disturbances in muscular system that can be objectively demonstrated. Station and gait normal, no ataxia, no marked tremor.

Sensory examination shows everywhere an accurate response to all ordinary forms of sensory stimuli. Scattered everywhere, but especially about the thigh and back, are small elastic nodules that move with the skin and vary in size and shape from 1½ cm. to 2½ cm. in diameter. Some are round, some ovoid. They are not tender and not segmentally distributed, nor do they follow as a rule the course of the peripheral nerves.

The ocular findings are just as they were before. Examination of discs show normal outline and color, somewhat shallow physiological excavation, small crescent, with pigmented border along vessels. Over the discs there is a white streak of apparently connective tissue, probably congenital. A slight area of refraction which is easily collected.

Pulse slow and regular about 78. Blood pressure from 140 to 155 dyastolic,

about 80 systolic. This is the average of the number of blood-pressure estimation.

#### HOSPITAL REPORT.

*Complaint.*—Hurting in bowels and lumps over body.

*Family History.*—Father living and well at seventy-five; mother also living and well at seventy. Has six brothers living and well and one sister living and well. Grandfather on mother's side died of tuberculosis. No carcinoma. Father never drank alcohol. No nervous affections or insanity. No Bright's disease or rheumatism. No heart disease.

*Condition from Infancy.*—Mumps and chicken-pox and pertussis when a boy. No chorea or tonsillitis. Never sick until when about twenty-five years of age he had some genito-urinary trouble. Had pain at end of penis. No discharge. No difficulty on urination. Had frequency. No blood. Had burning on urination. Was treated in St. Louis by urethral injections and sounds. Denies gonorrhea or syphilis. No rheumatism. Had malaria at twenty-five. No cough or night sweats or expectoration.

*Occupation.*—Farming all his life. Does not use tobacco. Drinks beer, one glass a month. Usually eats well.

*Present Illness.*—Was riding horseback five years ago and injured abdomen on horn of saddle. Never went to bed. No nausea or vomiting. No bloody urine. Also injured penis at same time, but not testicles. Had abdominal pain almost daily for a year. Dull ache like headache. After a year left. Did not have normal erections for a year. Has burning on urination at times. Thinks stream is smaller and does not flow as freely as before. No blood or discharge. Bowels regular. Food has no effect on abdominal pain. Does not know of anything that makes abdominal pain worse.

Has had bumps over body which are painful for past four and a half years. Abdominal pain and pain in bumps over body seem to be associated. When one is painful the other is also. Lumps never get red, but are very painful. Food has no influence. Has been treated for this trouble by several doctors. Gets attacks when he cannot work for one or two weeks at a time.

*Physical Examination.*—Patient is middle-aged, white, male, rather large frame which is symmetrical. No deformities. Bones large, symmetrical, tibia smooth, spine straight—no deformity. All joints appear normal—no limitation of motion or swelling. No clubbing of fingers. Muscles large, no myoidema, panniculus everywhere thick, pitting on pressure over both tibiæ.

Numerous subcutaneous nodules 1-3 cm. in diameter, scattered uniformly over entire body, more particularly over right thigh, back, anterior chest, and abdomen. These nodules are soft, skin readily movable over them. Very painful, no redness or heat, no varicosities.

*Skin.*—Face, neck and hands deeply pigmented, due probably to exposure to the sun. Numerous freckles over both arms and neck. Erythematous flush over face and neck. No evidences of old secondary eruption, no jaundice, nail beds good color, visible mucous membranes of good color. Numerous old scars over both tibiæ, heavy growth of hair. Skin otherwise smooth, dry and elastic.

*Glands.*—Cervical, axillary and inguinal not enlarged. Epitrochlears not palpable.

*Reflexes.*—Upper extremities, normal. K. K. present and equal on both sides. No Babinski or ankle clonus. Superficial abdominal reflexes normal. Station and gait normal.

*Head.*—Head symmetrical. Small tumor about 1 cm. in diameter over left parietal region. Temporal arteries thickened and prominent. No pain on

percussion over cranial vault, frontal and maxillary sinuses. No supra-orbital tenderness. No mastoid tenderness.

*Ears.*—No discharge or tophi. Hearing acute in both ears.

*Eyes.*—Lids appear normal. Slightly reddened. Sclera clear—no jaundice. Pupils, small, equal, slightly irregular. React to l. & a. External ocular movements normal.

*Nose.*—No deformity, no discharge, no obstruction. No deviation or perforation of septum.

*Mouth.*—No herpes, lips not cyanotic. Many teeth absent, gums retracted, pyorrhœa alveolaris.

Tongue protrudes in midline, no tremor, slight grey coat. Tonsils and pharynx injected.

*Neck.*—Symmetrical, no abnormal tumor masses or pulsations. Thyroid not enlarged.

*Chest.*—Symmetrical, broad and deep, well formed, no retraction of apices. P. N. everywhere resonant. Tactile fremitus normal on both sides. B. S. everywhere normal vesicular—no râles. Spoken and whispered voice normal.

*Back.*—P. N. everywhere resonant. Tactile fremitus normal. B. S. vesicular throughout, no râles. Spoken and whispered voice normal.

*Heart.*—P. M. I. not visible or palpable, no shocks or thrills. Sounds at apex clear and forceful. P<sub>2</sub> greater than A<sub>2</sub>, both accentuated. Second pulmonic reduplicated. Second aortic sharp and clear. No murmurs anywhere. Heart regular.

Pulse equal and synchronous on both arms. Vessel wall thickened. Tension slightly increased. Good volume. R. C. D.

R.	I. C. S.	L.
2.5	cm. II	3 cm.
2.5	cm. III	7.3 cm.
3.25	cm. IV	9.5 cm.
	V	8.5 cm.

*Abdomen.*—Symmetrical, slightly distended. P. N. everywhere tympanitic. Abdominal walls rigid. Palpation unsatisfactory. General tenderness especially around umbilicus. Kidneys, liver and spleen not palpable. Liver dullness begins above at 4th i. c. s. and extends to costal border.

*Genitalia.*—Linear scar on ventral surface of penis due to injury five years ago. Meatus markedly reddened and swollen, prepuce edematous, especially near frenum—due to cystoscopic examination this morning. Testicle normal. Inguinal rings, normal.

*Summary.*—Symmetrical painful, subcutaneous nodules distributed generally over body. General abdominal tenderness and rigidity. Pyorrhea. Increased reflexes, general. Arteriosclerosis, general.

Middle aspect and posteriorly there are small, tender, raised ovals about 1 cm. in diameter. Feels as though it is in subcutaneous tissues. Not an inflammatory condition or urticarial in nature. Several on abdomen and are symmetrically distributed. Over chest also. Large number on thighs, giving surface irregular feel. Subcutaneously more marked on front of thighs, especially right thigh. Many over back. Prostate not enlarged and not particularly tender. Rectum normal.

Redness around meatus. Genitalia otherwise negative. Rectal examination. Urine clear in three glasses. Rectal shows prostate normal size, thickened, tender. Both vasa palpable, but not nodular. Seminal vesicles indefinite.

Cystoscopic, no residual. Bladder capacity, normal. No prostatic obstruction. No stone or tumor in bladder but a very congested trigone and urethral orifice. L. ureteral orifice edematous.



Complete x-ray examination of gastro-intestinal tract before patient entered hospital, with findings entirely negative.

150 grm. levulose given five hours; specimens all of which were negative.

*Discharge.*—Patient not confined to bed any time during stay in hospital. On leaving still complained of a dull pain in suprapubic region and soreness of subcutaneous fat nodules. His levulose tolerance was found to be between 150 and 200 grm. G. U. clinic reports a chronic cystitis and urethritis. This, however, caused patient little discomfort. Strength and general health good. Was advised to report to O. P. D. whenever possible.

*Urine.*—Spec. Grav. 1.014.

Color: dark reddish brown.

Reaction: acid.

Sugar: negative.

Albumin, negative to faint trace.

Tests: guaiac strongly positive, acetone negative.

Microscopic: few w.b.c. and r.b.c., no casts.

*Blood.*—Red blood cells: 5,344,000.

White blood cells: 9,800.

Hemoglobin: 95%.

Differential:

Lymphocytes: 22.5%.

Large monos. and trans. 17.5%.

Polynuclear neutrophiles 57.5%.

Eosinophiles 1.0%.

Myelocytes 1.5%.

Stools, normal.

Temp., pulse and resp., normal.

Wassermann, negative.

X-Ray, lateral view, no abnormality.

#### LITERATURE COMMENT.

Symmetrical or segmental distribution of fat with or without disturbances of sensation escaped the neurological point of view until Dercum's paper in 1888, entitled, "Subcutaneous Connective Tissue Dystrophy of the Arm and Back Associated with Symptoms Resembling Myxedema."

If we are ready to assemble all the varieties of fat deposit associated under the head of adiposis dolorosa, four varieties are recognized:—

1. Adiposis Tuberosa Simplex (Anders).
2. Adiposis Cerebralis (Froehlich).
3. Adeno Lipomatosis.
4. Multiple Lipomatosis.

McCarthy in his article on Dercum's disease in Osler's "System" makes this classification. With the advance, however, in our knowledge in the past few years and the growing interest in the polyglandular aspect of the question there is probably little utility in so conventional a classification.

It is by no means certain that Dercum's disease or its sub varieties, as here indicated, form one clinical type. However, the justi-

fication for this curious grouping of rather dissimilar types is found in the association of disturbances in the polyglandular system in some of them; in the presence of pain, discomfort asthenia in all of them; in the pathological changes found in the thyroid, thymus, pituitary and sexual glands in two of them; and in the presence of fat as tumor masses, isolated growths, or multiple groupings as the most obvious clinical objective evidence in all of them.

It has seemed to me upon considering the clinical features of the cases here reported that there must be some relation between the occurrence of lipomata and the symptoms which are found together with them, and it seems likewise possible that we have here a definite clinical entity entirely separated from and distinct from Dercum's disease on the one hand and from the three sub-divisions which have been mentioned.

In a somewhat careful search of the literature I have been unable to find cases which correspond exactly to the two which I propose to describe here nor do I find sufficient resemblance between these two cases and Dercum's disease to warrant including them under this head, either as prime divisions or sub types.

In a general way the literature on lipomata is grouped under the term *adiposis dolorosa*, which naturally excludes the simple benign lipomata so commonly found especially in elderly people. The pain or discomfort that is at times found in cases of this type are due entirely to the presence of fatty masses adjacent to or directly involving peripheral nerves and are not at all to be considered as an expression of a general process involving the nervous system as a whole.

I shall, therefore, briefly abstract the original description of these three varieties together with comments concerning their possible identity with the two cases just described.

The literature on *adiposis dolorosa* is as you know very much more extensive and it is necessary to go into this at some length in order to find out two things. First, if under this title might be found cases similar to my own. Second, to see whether the various findings pathologically in reported instances warrant including these cases under the general head of Dercum's disease.

I might say here that the textbooks are extremely unsatisfactory. Oppenheim dismisses the subject in a rather easy way, mostly in fine print, assuming that they all belong to the myxedema type; acknowledging, however, the existence of *adiposis dolorosa* as worthy of some comment.

McCarthy's article in Osler's "System" is by far the best I have seen, though he finds no place for the fourth variety, multiple lipomatosis. For him, all the varieties are but sub-types of Dercum's disease. Church and Peterson's article is evidently a rather hur-

ried abstract of the Osler paper, and contains nothing of interest but a citation of the edema-lipoma article.

Adiposis tuberosa simplex is a condition described by Anders in 1908 and has reference to a condition in which scattered fat nodules with irregular distribution are found. According to Anders it is a part of the general condition of obesity and is amenable therefore to treatment. The tumor masses show no tendency to fuse together and are not elevated above the general surface of the body. They are sensitive to the touch and may be the seat of pain which varies in intensity within rather wide extremities. The pain is very severe in some cases, very little and even absent in a majority of instances. Lymphatic glands are not involved, the skin remaining soft, flexible and non-adherent. There are no other important symptoms. The general disinclination to exertion seems to be no more than may be found in obese individuals. The neurological findings are largely negative. The intimate association of this condition with corpulency appears to be undisputed; chiefly because the disappearance of these fat masses takes place when proper treatment of the general obesity is carried out. Four such cases are reported, and Anders is quite sure that this variety is not a part of adiposis dolorosa; chiefly on account of the absence of nerve pain associated with masses of fat.

This condition described by Anders is an entirely different clinical picture from the cases which have been described above.

The second division—adiposis cerebri, or Fröehlich's disease, is obviously an altogether different type. It is without doubt a form of glandular abnormality, sometimes congenital, associated with disturbances of the fat-producing mechanism as a direct or indirect result. In none of its manifestations does it suggest in the least Dercum's disease, and certainly not the type which forms the subject of this communication. Fröehlich first and afterwards Berger and Zollern have described this type of syndrome. It is sharply delineated clinically. The adiposity is frequently pronounced in the breast and abdomen. The sexual glands are atrophied, hair is lacking especially on the face; axilla, and pubis. The skin is dry, the nails are brittle and fragile. It is stated by some that there is a striking persistency of the childish habits, but this is only strikingly true if the morbid process has begun before adult life is reached. If the disease begins after puberty there is a tendency toward the loss of the secondary sexual characteristics, which condition is to be distinguished from true infantilism.

Fröehlich in his earlier work, 1901, *Ein Fall von Tumor der Hypophysis Cerebri Ohne Aprormegolie*, referred the symptoms to pituitary tumor, but later observations would tend to show that tumors at the base of the brain originating from the infundibulum may cause the symptoms and in addition the glycosuria, or increase in



sugar tolerance, so often found. Others have seen the primary changes in the atrophy of the sexual glands and the obesity which results as due to the disturbance in metabolism similar to the fat increase in old age. The most recent view seems to be that the anterior lobe of the pituitary, however affected by pressure, direct or indirect, may cause the symptoms or at least some of them.

Without burdening this paper by an extended citation from the literature of Frœhlich's disease, it is clear I am sure that nothing in this description bears the slightest relation to the two cases already described.

The connection between Frœhlich's syndrome and Dercum's disease is of interest. It makes clear the reason for including it under that head. The connecting link, of course, lies in the findings of the pituitary in both types. Dercum and McCarthy have found in one case an adenoma of the pituitary, and the close relation that exists between the ductless glands and particularly Cushing's demonstration of the part played by the anterior lobe of the pituitary makes for close connection of the two types.

*Adeno-Lipomatosis.*—In 1900 P. E. Launois and Bensaude published a paper which called attention to a heretofore little recognized type of lipomatosis under the clinical description.

It is characterized by the presence of diffusely symmetrical lipomatous masses located in various parts of the body, chiefly in the cervical region. The authors believe this condition to be due to a primary disease of the lymphatics. It is important as far as our present survey goes to note that they could find no important symptoms which were characteristic of the condition they described. It is obvious, therefore, that adeno-lipomatosis is outside of our present inquiry and belongs perhaps to the type of disease in which fat deposits are produced by faulty metabolism similar to the ordinary fatty tumors found so frequently in people of advanced years.

*Adiposis Dolorosa.*—It is to a consideration of the literature on this subject that I feel mostly concerned because it is in this class of cases that the most careful work has been done, and, owing to the increasing number of such cases published, a greater variety of types is given for comparison. If it is possible to find a number of cases described under this title which seem to be similar to the cases which I have described, then there will be little reason to regard them as new types.

*Adiposis dolorosa* was described by Dercum in 1888 from a case studied in the wards of the Blockley Hospital. Some two years after this first case was described a similar case was placed upon record by Dr. Frederick P. Henry and in 1892 Dercum grouped these two cases with a third which he likewise discovered in the wards of the Philadelphia Hospital and gave to the disease the name—*adiposis dolorosa*—or Dercum's disease.

In 1895 Ewald described a case which was evidently the same af-

fection and placed it in the same category as the cases placed on record by Henry and Dercum. Ewald therefore acknowledged the disease to be a separate clinical entity and gave the weight of his authority to the clinical differentiation which was made by the Philadelphia neurologists.

Subsequently 2 more cases were published by Spiller, 2 by Eshner, and 1 by Gurcondiceau. In Collins' article in the "American Textbook of Neurology," published in 1895, he refers to 6 additional cases which were studied by Peterson and Loveland.

The original case came to autopsy and the findings together with a clinical resume of the case of 1888 was published in 1900 in the *Journal of Nervous and Mental Diseases*.

It was this case as I have pointed out before that established firmly on a pathological basis the clinical entity heretofore known as Dercum's disease.

The pathological findings are in brief as follows: There was undoubted evidence of interstitial neuritis in the nerves passing through the fat masses with some evidence of atrophy. Marked proliferation of the perineurium and epineurium. There were no changes found in the large nerve trunks. In the spinal column there was slight changes found in the Goll's column in the upper cervical cord, which was probably of no importance. The pituitary gland was normal, but the thyroid gland, though quite small in appearance, showed a number of interesting changes. There was a compensating hypertrophy of the gland similar to that which follows experimental partial thyroidectomy. Dercum calls attention to the similarity of his findings to those in Halstead's experiment on partially thyroidectomized dogs.

The chief clinical points of Dercum's disease as published in the first description are as follow: The presence of huge pendulous masses of fat in the shoulders, arms, and buttocks, accompanied by severe pain, shooting and burning in character. In addition these fat masses are painful to pressure and the nerve trunks are likewise sensitive. The original case was observed eleven years before coming to autopsy.

In the same year Burr published a case with autopsy in which he found in addition to thyroid disease and interstitial neuritis a tumor of the pituitary gland which had destroyed all the glandular structure of that organ.

We have then in 1900 a pathological trias of this disease; thyroid and pituitary changes and the presence of interstitial neuritis.

In 1902 the most important contribution is without doubt Dercum's and McCarthy's paper, "An Autopsy in a Case of Adiposis Dolorosa." This was the fifth case to come to autopsy. In this case changes in the thyroid are very slight. Pituitary showed enlargement with new formations (adenoma). Interstitial neuritis is also present. The significant finding was, however, the presence of

hemolymph glands, found in the subcutaneous fat. These were regarded as compensatory structures due to profound disturbance of nutrition caused possibly by thyroid and pituitary disease.

Up to this point 28 cases of adiposis dolorosa with five autopsies had been published. It seems with this repeated clinical description and with the variety of pathological findings that Dercum's disease without question is a clinical entity.

There are many scattered references in the literature up to 1910, the year in which a very remarkable paper by Lyon appeared. Up to the appearance of this paper there seems to have been little real progress apart from the growing complexity in the methods of studying the cases, and the variety of pathological lesions found. There is likewise a tendency to discover all sorts of associated states, mental anomalies, hereditary features, and other things as part of the complete picture. For example—Fursoe and Pascol in 1908 report a case of dementia præcox with adiposis dolorosa.

There is little to be gained in considering the literature from 1902 to 1910 except to point out that interest seems to have lagged, or rather to become more concentrated to the subject of Frœhlich's syndrome and to the pure pituitary cases.

Lyon's paper, published in the *Archives of Internal Medicine* and presented before the Association of American Physicians, May 11th, 1909, collects, analyzes, and discusses critically the whole of the literature up to that time. His bibliography contains 203 references. The title to this paper, "Adiposis and Lipomatosis," suggests at once a new point of view on the part of the author. Twenty cases personally observed form the basis of the paper.

It is easily seen from this how rapidly the clinical material on Dercum's disease had grown.

Lyon's re-grouping of his cases is interesting:—

1. Adiposis dolorosa.
2. Obesity.
3. Nodular circumscribed lipomatosis.
4. Diffuse symmetrical lipomatosis.
5. Neuropathic edema.
6. Adiposis cerebrealis.
7. Combined groups.

This new classification is of great importance. Dercum's disease becomes now a variety under the general heading of abnormal subcutaneous fat deposits, sharing in equality with the four subdivisions in McCarthy's group.

Of all the new names we turn to No. 3, nodular circumscribed lipomatosis, as giving a possible clue to the group in which the two cases described in this paper might belong. Of the nineteen cases described only one suggests our present series, that is case 18. A summary of this case is as follows: Multiple, symmetrical nodular painful lipomatosis, no asthenia, slight nervousness, recurrence



after excision, onset of each new growth announced by preceding local pain, tenderness, blueness. Microscopic examination shows a small nerve within the growth. The two other cases of this type, one was hereditary, the other painless and symptomless. The case quoted in abstract is apparently not a true lipomatosis, but very likely a neurolipoma, or perhaps, there being no detail as to histological findings, a neurofibroma. (This case is by the way very suggestive of neuro-fibromatosis.)

In his final analysis of the cases classified under Group 3; that is, nodular circumscribed lipomatosis, Lyon suggests rather emphatically that cases belonging to this group are certainly not cases of adiposis dolorosa, although Dercum, I believe, has accepted them as included within the limits of this disease. It seems obvious that they are but a painful variety of the ordinary fatty tumors of small size and multiplication.

Kratnitz was the first writer to call attention to the occurrence of constitutional symptoms in single lipomata. He divides lipomatosis into two classes: Those with and without symptoms. He has 14 cases with symptoms included, nervous manifestations, pain, menstrual disturbances, rheumatic or rheumatoid symptoms. These symptoms as well as the symmetry of distribution of the lipomata stamps the case as a trophoneurosis.

Of Group 3, Lyons concludes as follows: "The symptomatology is similar to that of the other groups, many cases agreeing in all respects to Dercum's disease. Histologically the tumors are characterized by discreteness of the fatty deposits and the investment of connective-tissue."

With this paper of Lyons the survey of the literature may well cease. It is evidently the leading paper so far found on the subject and the only one that contains adequate mention of the class of cases considered in this paper.

#### CONCLUSIONS.

The histological examination of the small tumor removed from each of these cases shows pure lipoma, with very little of fibrous tissue. Various impregnation stains to test for the presence of nerve fibres were used, but none was found.

The 2 cases here presented showed the following characteristics, which may be said to form their clinical type:—

It is a chronic, progressive condition with asthenia and general depression, with early development of arteriosclerosis. The tumor masses are non-segmental, subcutaneous, and pure lipoma, with very slight connective-tissue. The age incidents, between thirty and forty years. There is a marked absence of general obesity. The unusual features are the progressive mental dullness, with periods of increasing forced inactivity, attacks of abdominal and cardiac pains, with marked decreasing sexual power. The x-ray findings are negative.

## DEMENTIA PRÆCOX STUDIES.

## THE RELATION OF SPASMOPHILIA TO CECAL STASIS.

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By BAYARD HOLMES, B. S., M. D., of Chicago.

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In my study of dementia præcox certain symptoms resembling a toxemia from blood-pressure depressing amines fixed my attention. Moreover, the adrenalin paradoxes furnished an added clue to the character of the amines and suggested the study of such amines as appear in ergot of rye. It was possible to find the catalyzed products of some of these amines in the urine, but these were not the ones that gave the dementia præcox-like reaction. Even in the blood our tests were not such as would discover the presence of the amines sought for, but in the stools one of these, the most toxic one known, was found in incredible and amazing uniformity.

It is well known that this amine results from the growth of *B. aminophilus intestinalis*<sup>1</sup> upon a media containing one of the amino acids—namely, histidin when kept at a temperature of 37° C. This is one of the colon bacilli and is always present in every colon.

By fluoroscopic study of the barium meal, the motor efficiency of the stomach and small intestine was found normal and completely empty at the six-hour seance, but the cecum retarded the test meal more than sixty hours and generally more than one hundred and twenty hours.

The cause of this delay seemed to be a spasm of the colonic sphincter of Cannon<sup>2</sup> which had evidently persisted for a very long time. This was evidenced by a reduplication or looping of the transverse portion of the colon as seen in Figure 1 (Case of Rudolph H.) and by a thickening of the wall of the cecum. This thickening as determined by autopsy *in vivo* (Eldon D.) was so great that the cecum might readily be mistaken for the stomach.

The spasm of the colonic sphincter in 2 cases of gastric crisis in tabes was immediately relaxed by the injection of 0.5 c.cm. of adrenalin (P. D. & Co., 1:1000 sol.); gas began to pass, the pain which had kept the patients in agony for days disappeared, and the patients went to sleep for fifty minutes during which the already subnormal blood-pressure fell still lower.<sup>3</sup> Adrenalin did not, however, relax the spasm of the sphincter of Cannon in cases of dementia præcox, and I have never had the hardihood to give large doses of belladonna.<sup>4</sup>

Thus my studies led me to a spasm of the colonic sphincter, a

symptom quite consistent with the catatonia, with the mannerism, and with the mutism of this terrible disease. In the anamneses, however, there was no clue to the cause of the spasm, but the study of spasms of other muscular rings in the intestinal, in the respiratory, and in the genito-urinary tracts led me from every direction to the study of spasmophilia, and this is the reason for presenting this subject here.

Everyone is familiar with the croup. It is called spasm of the larynx or *laryngismus stridulus*, false croup or laryngospasm. It was the dread of mothers, for diphtheria sometimes had been mistaken for croup. It is now known to be one of the common manifestations of a metabolic error of nutrition which results in such a condition of the blood as precipitates increased nervous and electrical reactions. It is called spasmophilia. Another far less common manifestation of spasmophilia is a spasm of the pylorus. This



Fig. 1.—Rudolph H——; fifty-four hours after barium meal. By fluoroscopic examination a fixed extra loop was found as if attached to the gall-bladder. Small pieces of the meal could be passed through by massage. Such a small piece can be seen in the reproduction. C. R., Cannon's Ring. B., Bacilli of fecal matter forced through Cannon's Ring by manipulation.

is a far more serious condition, and it has been treated by surgical methods. Why one child having those errors of metabolism eventuating in spasmophilia should have the croup, while another child with the same errors has pyloric spasms or "absences" has not yet been explained. Spasmophilia may be recognized by numerous tests or phenomena. The Trousseau phenomenon is observed if the arm is constricted. The hand and arm assume the obstetric position. "These convulsions last five, ten, or fifteen minutes, and sometimes even one, two, and three hours in succession. . . . Then the affected parts become movable again, until, after a variable interval of rest, fresh paroxysms recur, the series of which constitute the attack. . . . So long as the attack is not over, the paroxysms may be reproduced at will. . . . This is effected simply by compressing the affected parts, either in the direction of their principal nerve-trunks, or over their blood vessels, so as to impede the venous or arterial circulation."<sup>5</sup>



The Chvostek phenomenon is elicited by tapping the cheek over the seventh or facial nerve. The muscles about the mouth of the spasmophilic child contract while there is no such reaction in the normal child.

In 1906 von Pirquet announced to the *Gesellschaft fuer Kinderkrankheiten*, then meeting at Wiesbaden, an observation worthy to be reckoned a major medical discovery like that of the discovery of the tubercle bacillus by Koch, or like the complement fixation of Wassermann for syphilis. He showed that the anodal opening contraction, with the electrode over the peroneal nerve behind the head of the fibula, does not occur in the normal infant with less than five milliamperes of the galvanic current while in spasmophilia contractions occur with a much smaller amperage. A relative hypersensitiveness to the anodal closing, the cathodal opening and the cathodal closing confirms the more sensitive observation. In the normal child, with the electrode applied over the peroneal nerve, no contraction appears with less than five milliamperes of galvanic current on anodal or on cathodal opening. This is an early and constant phenomenon in spasmophilia with a much smaller amperage. This test is quickly, easily, and positively diagnostic of spasmophilia.

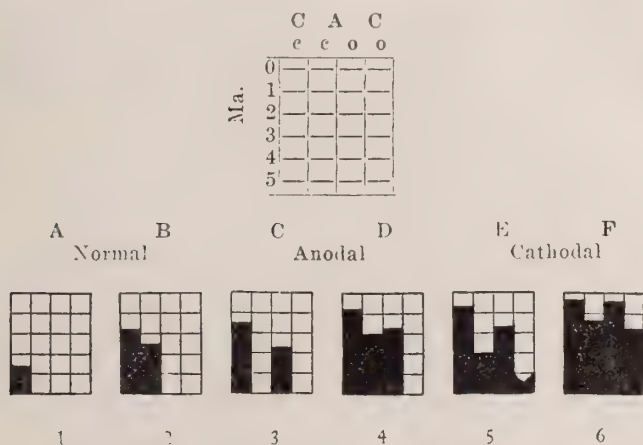
The attention of pathologists was early aroused to the calcium factor in spasmophilia by the statement of Robert Quest, that the brain in this disease is deficient in calcium. The brains of artificially produced tetany in animals have been shown by MacCallum and others to be deficient in calcium. The excretion of calcium in spasmophilic children is excessive. Grulee has studied the metabolism of spasmophilia patients without any conclusive results.

Based upon the chemical examinations of urine, blood, and autopsy material, the calcium chloride treatment of spasmophilia has proved clinically the thesis that the hypersensitiveness is due to a deficiency of calcium. The acquisition of calcium salts is promoted in these patients by the administration of phosphorus-containing cod-liver oil (1:10,000, Kassowitz' prescription) and the withdrawal of eggs and cow's milk from the diet. The improvement that follows large doses of calcium chloride in orange juice, with or without phosphorated cod liver oil, as observed with the von Pirquet<sup>6</sup> electrical reaction and the diminution of symptoms is marvelous, and etiologically almost convincing. The following cases are illustrative and convincing.

CASE I.—This is a boy, seen by Dr. J. P. Sedgwick<sup>7</sup> in consultation with Dr. Logan, of Rochester, Minn. He had his first slight convulsion in November, 1910. In January, 1911, he had a mild convulsion, accompanied with bronchitis, high temperature and delirium. The third convulsion was in September, 1911, when he had two with a two-weeks' interval, also with fever and delirium. In January, 1912, he had his most severe attack. He fell unconscious from a chair. This was followed by delirium and temperature

up to 105° F. Pneumonia was diagnosed the next day. When I saw him first on April 4th, 1912, he was two years and nine months old, over-nourished, with exudative tendency. The physical examination showed nothing further of importance except a marked Chvostek phenomenon and spasmophilic electrical reactions, as shown by the accompanying von Pirquet Chart I.

A diagnosis of spasmophilic condition was made from the Chvostek, and the pathognomonic anodal opening contraction with less than five milliampères, that is, 4.5 milliampères. The attacks were brought about in the spasmophilic or predisposed child by intercurrent disturbances, bronchitis, and pneumonia. The acute disease acting like a detonating cap in a charge of powder. The father was greatly relieved, as epilepsy had been suggested to him. A good prognosis was given and the boy advised to take a diet low in milk and eggs, with free use of vegetables. The classical specific Kassowitz prescription of



Charts 1 to 6, as given by von Pirquet, show the normal reactions as well as those of hyperexcitability.

Charts 1-2.—Normal reactions given by von Pirquet. The third column must be blank and the fourth and second may be.

Charts 3-6.—Hyperexcitability reactions given by von Pirquet. The third is always dark and other spaces may be.

one part of phosphorus to ten thousand of cod liver oil, was given. He has had no attacks since.

CASE II.—Jack L., a Canadian baby, was seven months old when Dr. Sedgwick first saw him, April 21st, 1911. His feeding had been the common Horlick's and Mellins', ending in a condensed milk climax. He had had three convulsions during the preceding week. He had craniotabes, the greater fontanelle was 4x6 cm. The rachitic rosary was marked, and he presented a characteristic Harrison's groove. The patellar reflexes were exaggerated, and he showed the Weiss reaction, which consists in a contraction of the muscles supplied by the upper branches of the facial nerves upon tapping just outside the palpebral fissure with a percussion hammer. The Chvostek phenomenon could not be elicited. A diagnosis of spasmophilia was made upon the electrical reaction (Chart II).

The milk was, therefore, discontinued, and phosphorus and cod liver oil given with subsequent improvement of the reactions.

But as the babe was losing weight on the strict cereal diet, milk was again

begun in tablespoonful doses which was followed by a return of the spasmophilic reactions.

A wet-nurse was secured April 25th, and the general condition of the babe, as well as the electrical reactions, improved steadily.

He recovered completely and the later reactions were as follow: June 10th, 1911, K. C. C. 2 Ma.; A. C. C. greater than 5 Ma.; A. O. C. greater than 5 Ma.; K. O. C. greater than 5 Ma.

On June 10th, cow's milk was added to his diet, as the mother wished to wean him and discharge the wet-nurse. The reaction on June 12th showed slight spasmophilia.

On October 5th he had a slight scarlatina but no convulsions. After an at-

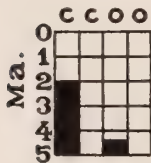


Chart I.

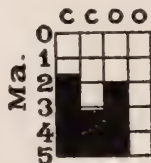


Chart II.

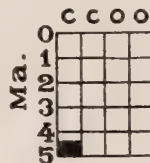


Chart III.

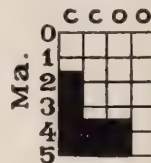


Chart IV.

tack of entero-catarrh, July 27th, 1912, the examination showed no spasmophilia (Chart III).

CASE III.—Luther Nussl was four years old when first seen, December 3rd, 1914. He had had asthmatic attacks (spasms of the bronchioles) for three years. His electrical reactions are given below (Chart IV).

Phosphorus in cod liver oil was begun on January 13th, 1915; although he was definitely improved, he was still having occasional attacks and slightly abnormal electrical reactions. Calcium chloride, 5 grm. per day, was, therefore, begun and the oil continued. Although the calcium was discontinued by the mother in February, there had been no more attacks from the time the calcium was begun until his last visit, June 5th, 1915.

Many spasmophilic children are strong, sturdy, and very active. They are quick-motoned and irritable. The condition is not rare anywhere and in some communities very common. Ibrahim states that at certain times of the year he found that one-third of all children gave the von Pirquet reaction for spasmophilia.

The condition is not inconsistent with rickets and craniotabes or other evidences of long-continued rachitic nutritive disorders, but osteomalacia and *fragilitas ossium* are not mentioned. They ought, however, to be associated with spasmophilia.

Friedmann found, in certain children without hysteria and without epilepsy, "absences" somewhat resembling *petit mal* in that there was the von Pirquet reaction of spasmophilia. These "absences" begin in apparently healthy children from the fourth to the seventh year, usually from fright or shock. There is brief loss or disturbance of consciousness without convulsions or without falling, and the attacks are from the start very numerous, ten to one hundred a day. The onset is sudden and the episodes may continue uninterrupted for many months or years. The prognosis is relatively favorable and recovery takes place spontaneously after some years,



usually before puberty, without much mental deterioration and without obvious physical defect. Mann found in 2 cases the electrical reaction of von Pirquet.

The ultimate effect of spasmophilia upon the mental faculties is certainly not beneficial. Thiemach and Mann estimated that one-third of all cases show at least some mental retardation or permanent injury of cerebration.

The relation between a deficiency of calcium on the one hand, and spasmophilia and rachitis on the other, however well established by experimental and clinical research, brings us only one step nearer the ultimate cause of the disease. Should subsequent research demonstrate a condition of spasmophilia in cases of dementia præcox to account for the spasm of the colonic sphincter, it would still leave us in the air in regard to the source of the calcium deficiency. So far as I know, the proportion of calcium in the blood, in the tissues, and in the excretions of dementia præcox patients has not been experimentally determined. Personally, a little quantitative study of the urine of dementia præcox patients leads me to expect that a deficiency of calcium will be demonstrated in the blood. The calcium alone, of all the urinary constituents, was noticeably *increased* in every quantitative estimation in one catatonic patient.

It is a common experience that osteomalacia is frequently associated with dementia præcox. It is not unlikely, then, if I have not been misled in the interpretation of my observations, that the study of spasmophilia and the solution of the calcium deficiency problem will bring us a step nearer to the discovery of the etiology of dementia præcox.

There is one other side-light on the calcium content of the blood and its relation to dementia præcox which may be held in mind. I have demonstrated the presence of histamin or betaiminazolyethylamine in the stools of dementia præcox patients and have shown that these patients manifest symptoms of betaiminazolyethylaminæmia, especially in the adrenalin paradoxes. Now Vanysek<sup>8</sup> has shown that calcium chloride alone causes a relaxation of longitudinal muscular fibers of the intestine. But if an excitation of this muscular layer has been previously produced with histamin, then the calcium chloride acts paradoxically and causes a contraction of these fibers. It often produces an intensive, temporary, intestinal contraction of great violence. It seems remarkable that Vanysek could not produce similar paradoxes with alkaloids of the muscarin group. Hormonal, however, produces the calcium paradox. Glycylhistamin is much weaker than histamin.

The rapid changes in the easily recognized morphologic picture of the blood<sup>9</sup> points to equally rapid changes in the chemical elements of the serum, which can be estimated only by time-consuming methods. The vacillating course of dementia præcox suggests an

unstable equilibrium in which one morbid factor after another gains ascendancy and shows its effect in the mental manifestations.

Spasmophilia, then, whether dependent on a calcium deficiency or not, seems a probable factor in producing the colonic spasm which we have demonstrated uniformly in dementia præcox. Research should be made to determine whether spasmophilia exists in dementia præcox patients and under what conditions. The treatment of this irritative condition has been so uniformly successful in pyloric spasm that it should not be neglected in spasm of the colonic sphincter in dementia præcox. In addition to the appendicostomy and the irrigation of the cecum and colon with yeast-containing fluids, the patient should be given calcium chloride, 5 to 10 grm. a day, until the von Pirquet electrical reaction falls to normal, and there it should be kept. The synergic action of phosphorus has been clinically confirmed and should not be neglected. Treatment should be combined with re-educational methods, with outdoor sleeping, and with the exposure of the body to sunlight and air. The stimulating effect of the hypodermic use of sodium nucleate (Lundvall's solution) has been miraculous in some patients, helpful in most patients, and harmful to none. Until the complete solution of the dementia præcox problem is accomplished, the remedy cannot be neglected.

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## ON SHAME.

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By JAMES RAE, M. A., M. D., of Birmingham, Eng.

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## I.

Here we shall consider the effect of shame; then try to discover why we feel it at certain times, and whether it can be represented as the development of any other emotion.

In the first place we must establish the physical signs and accompaniments of shame: the attitude changes slightly; there is a movement of withdrawal, a shrinking from notice. The eyes are averted or downcast and the head droops. The face flushes and the dilatation of the vessels may extend over the chest or even further; the pulse-rate is quickened. A tingling of the skin is next perceived as the vessels contract and the face pales. At the same time there is—though perhaps only momentarily—a confusion of thought.

Here is a physiological state. The vasomotor centre is activated by the emotion and the fibres must therefore have a connection with the frontal lobe. We know that the vasomotor centre lies in the grey matter of the floor of the fourth ventricle and the fibres are believed to pass down the lateral tracts. The vasomotor fibres to the face are mixed up with the fibres of the seventh and ninth cranial nerves. It is, however, the depressor fibres that are concerned with flushing and their exact course is uncertain.

There is evidently a disturbance of the higher control, and it is interesting to recall the homologous phenomenon of the total absence of shame in dreams, though its presence might be expected as an accompaniment of social progress. However abruptly a person wakes out of a dream of crime or indecency, no shame is felt, even if the course of the dream be deliberately retraced.

Shame may arise from personal modesty, from fear, from appearing at a disadvantage, from hearing of or seeing some untoward behavior in others, without there being any association with the shamed person.

## II.

The shame from infringement of personal modesty is frequently seen in the operating theatre in women, but the discussion of this may be postponed for the present. The same variety is sometimes seen in highly-strung boys, who will refuse to learn swimming because of the necessary exposure of their bodies. A most remarkable



instance of regard for personal modesty is the historical one of Philip II of Spain. This King gave stringent orders that after his death the persons who tended his corpse were to cover his private parts with a linen cloth, having their faces veiled the while, under penalty of execution. In both instances the feeling appears to be due to a fear of ridicule of personal appearance or detraction. There are a few cases—not to be too readily believed—of men inordinately vain of their beauty having recourse to a thick veil after receiving facial injuries. Was the 'Man in the Iron Mask' the victim of disfigurement? To exhibit the extreme of grief the Greek artist painted a curtain to conceal the face as if from shame at revealing emotion. Again, we have the sixteenth-century ruff and the wide skirt introduced to hide deformities of King's favorites, while the yellow ruff went out of fashion because a woman poisoner in the first years of the seventeenth century wore one at her execution. This, however, belongs more properly to shame at untoward behavior in others.

To return now to the shame felt by women about to be operated upon; this is noticeably the case with the hospital patient. If her chest is uncovered for the anesthetist, her arms are at once crossed over it; again, on coming round from the anesthetic, if her dress is not adjusted, she will invariably repeat the gesture. With women not of the hospital class this does not hold true, and the explanation is undoubtedly to be found in their custom of exposing shoulders and arms in evening dress. Apparently the shame that a young girl might be expected to feel at appearing at her first 'grown-up' dance in a costume so different from what she has previously worn is entirely overcome by her readily understood excitement.

Some may recollect the two-century old story of the young Spanish princess who was escorted to France to be married. On her way the mayor of a small town through which she passed prayed that the community might present her with the silk stockings the town produced. He received the shocking reply: "Fellow, the Princesses of Spain have *no* legs!" A curious survival of this delicacy about women's possession of lower extremities is the feminine trick of pushing the skirt down a trifle when a woman is sitting, and this is still practised even in these days of skirts which just cover the knee. Women show no shame in bathing before a crowded beach, and indeed I am told by a friend that during the hot summer of 1913 women walked about the piers of south-coast towns with a 'university' swimming suit and slippers as their sole covering. It is in fact noticeable that the persons who most quickly cover themselves with a wrap after leaving the water, are males.

It is significant that for four hundred years women have been in the habit of exposing in the most liberal way the upper part of the thorax. The only exceptions to this are the period of about

thirty years in the seventeenth century ended by the Restoration excesses, and that of less than a decade towards the end of the eighteenth century which was followed (in France) by the scandalous caricatures of classical attire, and the Empire and early Victorian fashions.

As this is not an essay on costume we had better leave this part of the subject. What has been said is intended to show that the most outrageous lack of peripheral covering is placidly accepted by a woman if the fashions of dress so decree, and that in women personal modesty is but a matter of convention. Anyone who wishes for further details has only to refer to "Studies in Psychology of Sex," by Havelock Ellis, Part II, pp. 7-13.

### III.

The preceding section has been simple, but in considering fear as a cause of shame we come to a matter of great complexity. Fear is produced by

- (a) Physical danger.
- (b) Personal loss or inconvenience.
- (c) Possible punishment.
- (d) Wrong conduct (moral fear).
- (e) Anxiety for others.

These causes of fear are, if not faultlessly arranged, at least comprehensive. Which of them can we delete with reference to shame? The last is cancelled at once, since anxiety for the welfare of others is a virtue. It is true that shame may be due to virtue, but this we shall consider at a later stage of our analysis. As for the others it is not they but the fear of them that causes shame; yet even this statement has to be further modified.

Fear may be so intense as to abolish all shame (in the person afraid) at the display of it. If the individual's higher centres are sufficiently developed, he will be enabled to confront the danger though still afraid, and even though his fear be such as to leave no room for shame, he may nevertheless remain fully alert and capable. Cowardice is nothing but physiological weakness of control, and if a man is incapacitated from performing his task by sole reason of his fear of physical danger he does not feel shame until the fear and its cause have passed away.

Fear of personal loss or inconvenience is not strong enough to produce shame unless the fear has to do with some unworthy object, in which case the consciousness of the unworthiness may give rise to shame. One may be 'afraid' of missing a train, for example, if the feeling be genuine fear and not merely discomfort, but the actual missing it does not cause shame unless it is due to laziness or to carelessness. In the latter case it is placed more correctly in the group of fear of wrong action and possible punishment.

The mere contemplation of a wrong action, although the intent of committing it be entirely absent, is a cause of shame. It by no means requires such an action to be carried out before repentance is experienced. An unexpressed distrust of someone which is later found to be baseless, an entirely mental elaboration of a scheme of revenge, a 'sight of means to do ill deeds' are all capable of bringing about a rush of self-contempt ending in shame, though it, no more than the origin of it, may be disclosed. (The true origin is the realization that the particular thought is a wrong one; which implies, first, the evil thought, second, a criticism of it, third, a comparison between it and an abstract moral standard, and fourth, the condemnation. Some would add that there must be a thinker before there can be a thought, but the problem of whether this should not rather be expressed as "The *consciousness* of thought implies a thinker" would lead us far into the realms of philosophy.) The shame of possible punishment powerfully reinforces the influence of the moral standard. 'Because right is right to follow right' is a motive less potent now than it was in the days of the Greek sophists, and the modern man is more often deterred from wrongdoing by fear of its consequences than urged to virtue for its own sake.

When a wrong action is committed, it is condemned by an abstract moral standard which depends on tradition both religious and family, modified by personal habits. The common practice of swearing is not acquired until the early sense of shame at using profanity is lost. Leigh Hunt's essay describing his childish self-torture at being "the boy who said 'damn'" is a good illustration of this. There are many people who swear almost without realizing they do so, and yet avoid the use of certain expressions, while the Oriental references to the probable ancestry of the hearer are repugnant to the European mind. Similarly, a man who after leading a normal life transgresses the law of the land, may 'feel his position acutely' to use the routine phrase of sensational journalism, either in the dock or when released from prison, but if several times convicted loses all sense of degradation.

#### IV.

This leads us directly to the next cause of shame—namely, appearing at a disadvantage. As civilisation endures certain conventions are established, and any infringement of these causes shame. A man tells us of his father's death and we condole with him on the loss; if truthful we might feel bound to declare that 'such a disreputable and drunken old scoundrel is better off the earth,'—but we should be ashamed to do so. We offer amiable congratulations on a badly-executed song or sketch, and feel no shame at our lying praise of it. These minor hypocrisies seem quite inadequate to



arouse a sense of shame. The person whom the action most nearly concerns feels no shame at it, and it is the truthful critic who would be shamed.

Let us return again to the example of the exposed law-breaker—be he embezzler, forger, cheat, or liar. It is true that he may feel shame at the planning of his crime, but it is a self-contempt not identical with his emotion when he is publicly stigmatised as dishonest. In this case he thinks of the loss of trust, of position, of friends, and of money, and when his misdeeds come to light his first impulse is to save himself. The disgrace to his business partners and to his family is beyond his thoughts, which are entirely devoted to his own loss of public repute.

But we are not driven to such crass examples to illustrate the shame felt on appearing at a disadvantage; there are many minor ones we may cite. Tripping on a rug at the entrance to a crowded room, upsetting a glass, a thoughtless remark which at the time or later one finds has deeply hurt the feelings of one's hearer, all produce shame, and the mere recollection of them revives the feeling for some time afterwards. Of a similar nature is the shame experienced at appearing in inappropriate dress at some public function or wearing at an unusual time some costume quite suitable in itself for another occasion.

In an earlier paragraph the statement was made that virtue may be a cause of shame. It is quite possible to know one is in the right and yet feel shame. One may be disgusted by an obscene jest, by an account of astute commercial dishonesty, and be shamed because one is the only member of the company who does not admire it. This may be due to one's own wish that one had more worldly wisdom; there is no surer way to flatter the boy of nineteen than by treating him as one acquainted with all forms of evil. The feeling of shame in such circumstances may be a genuine disgust at whatever has called it forth, but there is more often that perception of appearing at a disadvantage. The blush of conscious innocence may in truth be due to an apprehension of ridicule at ingenuousness which is discordant. Again one may do a generous action or take some trouble to help another, and at the same time be most anxious that one's kindness should not be known. Why shame should be felt for this reason is difficult to explain except on the ground that bringing oneself into prominence is in a way appearing at a disadvantage.

## V.

Next we have to consider shame caused by untoward behavior in others. We have already mentioned an example in the yellow ruff. Another instance is the avoidance of the name Stephen by the English Royal Family. The horrible wickedness of the one king of that name has banished it from the families of his succes-

sors, save as a subsidiary. (It must be stated, however, that the significance of this avoidance is largely diminished by the many changes in dynasty.) As other instances of what may be termed national shame, are the effects produced by the news of the fall of Khartoum and the 'Black Week' of the South African War.

Members of a class may be shamed by an opportunist abandonment of principle by a large body of the class. Then too there is the family shame of owning a disreputable member, or facing the scandal which is attached to suicide or to marital infidelity. "Visiting the sins of the fathers upon the children" might be interpreted as fixing the period required for the shame of a family disgrace to pass away. Of a similar nature is the shame felt at hearing a relative make a tactless or brutal remark, just as though the hearer himself were guilty of it. To this we must add the shame felt by onlookers at the display of fear by another. All this appears once more to be due to a sense of depreciation in value of a part which must affect the whole, and so cause the whole to appear at a disadvantage.

## VI.

Such an analysis of shame requires to be completed by drawing a distinction between shame and certain other emotions. We have already mentioned the physical signs of shame: blushing and shrinking may be due also to diffidence or to shyness; blushing to anger, but in this case there is no shrinking, and the blush is less extensive. Shame, as we have attempted to show, depends on the opinion of others. Both diffidence and shyness are produced by a sense of unworthiness or inferiority in the individual, quite irrespective of the estimate of others. This statement that shame depends on the opinion of others is by no means contradicted by the possibility of the individual feeling shame while alone, for there is always the reference to a standard other than his own. But the shy or diffident person notoriously feels sure of himself in solitude. In imaginary rehearsals of scenes through which he has passed—actually to his own confusion—he always carries himself with easy self-possession and *l'esprit d'escalier* is famed for its brilliance. He can make plans for his confident behavior, but the presence of others disconcerts him totally. Shame it may be repeated is experienced quite irrelevantly to the presence of other people.

Were all afraid or immodest, or brutal or obscene, or dishonest or disgraced, none would feel shame. From what has been expressed in the foregoing paragraphs, it will be seen that shame is invariably set up by an *incongruity* between the shamed person and his associates. If the particular circumstances involved no loss of position—moral or material—it is doubtful whether shame would ever be felt. And as this dependence on the opinion of others is the important factor, it does not seem too far-fetched to define shame as 'the social expression of self-interest.'

## WHAT IS INSANITY?

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By L. B. PILSBURY, M. D., of Lincoln, Nebr.

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What, if anything, has biology to do with insanity? What possible connection can there be between reproduction, evolution and development in general and the all too common manifestations of mental aberration which we see about us? In the first place, as everyone knows, some children are born obviously deficient and some progress with apparent normality to a certain point, after which no further development occurs. Certain somatic factors, lack of nutrition, perverted functioning of ductless glands, traumatic injuries or infectious diseases are doubtless responsible for some of these cases, but in other instances there seem to be either anatomical peculiarities in the central nervous system or a congenital lack of developmental force. Whether the defect is altogether inherent in the germ plasm or arises through injury to the ovum at some stage in its development, is often very difficult to say, and in the light of our present knowledge is largely a matter for speculation only.

What biologic factors can there be which will show themselves in mental abnormalities only after the adult or at least the adolescent period of life has been reached? As a matter of fact, it is doubtful whether the factors which lead to adult insanity often fail to give some indications of their presence at an earlier period. However, these indications may be obvious only to a trained observer or only when viewed retrospectively. In the face of the almost universal presence of either actual or potential abnormalities of mind or character, we must gratefully conclude that we are indeed fortunate if our original inheritance and our experience of life endow us with sufficient stability and energy to enable us to stand up and go forward. We come into existence by virtue of a mixed germ plasm passed on and on with constant modifications, and not always advantageous ones, through a chain which, though it may conceivably end with ourselves, has at least begun for all of us at a period almost inconceivably remote.

Are we to suppose that primitive man was more or less liable to mental derangement than is the human race of to-day? This is a question that cannot be answered by any sort of direct paleontologic or archeologic evidence. The history of psychiatry goes back only as far as we have some sort of documentary account of such things. By inference, we may assume that contemporary man, hav-



ing a nervous system more highly organized biologically and a mind more highly evolved culturally and ethically, is therefore more liable to insanity, but this is not a necessary inference. In fact, just the opposite might very plausibly be maintained, on the ground that a higher degree of immunity, a greater habituation to adverse factors, would naturally come with higher development. This is indeed an interesting subject, but the history of man is too replete with variables to enable us to draw any hard and fast conclusions. The study of anthropology gives evidence of certain procedures, such as trephining of the skull, among primitive races, which are of possible medical, though not of psychiatric, significance. That they had nothing to do with any psychologic speculation is suggested by the fact that early races never supposed the brain to be the seat of the mind. Such a large and vascular organ as the liver seemed much more reasonable as the residence of the soul even until comparatively modern times, and we still use the heart figuratively in connection with the emotions.

For several reasons it may seem probable that insanity was less common among primitive man than it is to-day. For one thing, when it did exist, it was probably less readily recognized, partly from a less keen apprehension of such matters and partly because of a different point of view. Instead of being looked upon as biologically inferior, the insane person was often regarded as having occult and superior powers. He was in touch with an unseen world and there was sometimes no limit to the superstitious reverence in which he was held. As the race evolved, it was perhaps not difficult to pass from a feeling of reverence to one of fear and loathing, a state of mind which is only too prevalent even at the present day.

Although life is now complex, strenuous, and in some respects very difficult, we must not forget that it was to primitive man a hard and bitter struggle indeed, though perhaps mitigated by the fact that his activities were relatively simple and his wants comparatively few. Food, warmth, shelter, limited companionship and the gratification of the reproductive instinct largely bounded the horizon of our earliest forefathers. Higher ethical and spiritual yearnings were a product of a later time, one with broader conceptions, deeper sentiments, greater mental activity and far-carrying ambitions. Nevertheless, it is difficult to say whether we are better or worse fortified against mental upset than were our progenitors, and it must be borne in mind that we subject ourselves more or less voluntarily to the influence of certain poisons, bacterial and chemical, which may have been unknown to them. To some extent we assume our own risks, albeit often in ignorance, and to some extent we are simply at the mercy of our hereditary endowment. This is not a counsel of despair, but rather one of prudence and forethought. Obviously, one with a large hereditary handicap can

scarcely afford to be careless of his habits and surroundings, but hereditary defect, unless entirely latent, may in itself lead to disadvantageous situations. In some instances a congenital lack of resistance simply predisposes the individual to the various influences which are most likely to do him a disservice.

Inasmuch as insanity is a failure of adjustment between an individual and his surroundings, and inasmuch as none of us reaches a state of perfect and complete adjustment, it follows that there are all degrees of mental unsoundness and that the line of demarcation between sanity and insanity is far from being sharp and distinct. On the contrary, anyone who is accustomed to precise definitions and sharp distinctions is likely to find the border zone very hazy, indeed. It is a populous zone, too, and filled with all manner of vagaries and eccentricities, in fact every sort of variation short of that degree of impairment which is too obvious to be ignored. Of course, there is more than one kind of adjustment, and that which is most advantageous to a given individual is not necessarily that which is of most advantage to society or the race at large, a fact which is often noted and well understood by students of economics and sociology. While the welfare of society is almost altogether dependent on the welfare of the individual, the individual can and sometimes does flourish at the expense and to the disadvantage of the community or the nation. When the person who is reaching this faulty sort of adjustment is a criminal we lock him up, and when he is what we call mentally incompetent, we also take steps to relieve him of the necessity of trying to adjust himself to the world at large, an environment which has ceased, for the time being at least, to be biologically advantageous to him. There can be no debate over the obligation of society to care for such an individual by placing him where the process of adjustment will be easier for him, but there is and will be debate over the advisability of biologically segregating, by custodial isolation or otherwise, the vast army of obviously unfit whose descendants to the third and the fourth generation may otherwise be a charge on society. It is thought by some that the isolation of the unfit has already begun to decrease the relative incidence of insanity, but at any rate there is an absolute if not a relative increase in the number of insane charges from year to year. This is partly due to better diagnosis, partly to the increased willingness of families to send their insane relatives to state hospitals, and partly to the fact that more babies with impaired resistance are saved to grow up and meet the complex hazards of adult life.

Our biologic equipment for existence consists of those hereditary and largely unconscious factors with which we come into the world, and those other environmental and more largely conscious factors which are added to us through our daily experience. Some of us

sooner or later fall into conflict either with ourselves or with our external environment and become then what we call insane. This simply means that we can no longer live in harmony with ourselves or our neighbors, on account of an inadequacy or failure of the mechanism of adjustment which is composed of the congenital and empirical factors mentioned above. Disharmony arises through a process of dissociation brought on perhaps by an incompatibility of different components of the personality. We all have the experience of wishing for things that are not good for us, but we do not all allow our personalities to be disrupted through a state of unbearable psychologic tension. However, disruption does take place in some instances; and were we to ignore all possible somatic factors, we might conclude that insanity always comes about in this way; but some insanities certainly have a physical basis and are dependent on more or less gross lesions of the brain. Some are due to syphilitic or other infection, some to alcohol or drugs, some to senility, and some we are at a loss to account for, but all have in common the feature of failure of adjustment on the part of the most complex mechanism that we know anything about. As part of a worthy and ambitious program for the future, let us employ every reasonable means not only to cure our insane, but better yet to lessen their number through the removal of those causative factors which are within our control.



RACE PROGRESS VS. RACE DEGENERACY.

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By CASPER L. REDFIELD,\* of Chicago.

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The eugenist doctrine of the present day is about the most helpless thing on the face of the earth. It proposes cutting off the inferior end of the general population and then sitting down to wait for something to happen of itself at the superior end. It has no scheme for improving anything except the abstract average, and that scheme is as full of holes as a sieve.

Statisticians figuring on what happens when things are left to themselves have established what they call the "law of regression," which simply means that disturbed things return to their normal position when the disturbing force is removed. What happens to the upper end of the human scale is a prompt movement downward to the mediocre middle, and what happens to the lower end is a prompt movement upward to the same middle. What happens to a continually disturbed middle is movement in both directions away from the center. Trying to raise the human level by simply cutting off the lower end is like trying to disturb the ocean level by bailing water out of one side.

The statement that from powerful-minded parents we get powerful-minded children, and from feeble-minded parents we get only feeble-minded children, is true in the strict technical sense, but it is not true in the loose way in which the statement is usually made. The Binet system establishes certain standards for normal-mindedness at certain ages, but it has no standard for telling us what is normal-mindedness for the average parent when the average child is conceived. In absolute grade of intellect, a feeble-minded person of twenty is mentally superior to a normal-minded child of five or six. Similarly, a feeble-minded person of fifty may be the mental superior of a normal-minded person of twenty. When compared with a properly established standard for the average parent when the average child is produced, the so-called feeble-minded person may be above that standard and the so-called normal-minded per-

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\*Mr. Redfield has written extensively on the subject of the causes of evolution and degeneracy, and though his theories may not be acceptable to all, they nevertheless indicate that the author has studied the subject in a most thorough manner, and has evolved certain ideas which, if followed, would undoubtedly improve the race. "Dynamic Evolution" (G. P. Putnam's Sons, New York and London), contains Mr. Redfield's best thought on the struggle for existence, and no reader, be he medical or otherwise, who is interested in the reasons why there should be an increase or a decrease in animal energy from one generation to another, should forego reading Mr. Redfield's concise and clear presentation of the fruits of his studies and observations.—LITERARY EDITOR.

son may be below. If two such men became fathers at fifty and twenty respectively, the superior child would come from the so-called feeble-minded parent and the inferior child from the so-called normal-minded parent. By reason of the absence of a standard for normal-mindedness for parents when the average child is produced, the facts are frequently construed as being exactly the reverse from what they actually are.

That mentality develops with age is explicitly recognized by the Binet system. The normal for a ten-year-old is much above the normal for a five-year-old. That the difference in mental development is reflected in the offspring is established beyond all question. Superior children come from old parentage and inferior children come from young parentage. When old parentage is repeated for several generations we get our eminent men, and when young parentage is repeated for several generations we get feeble-mindedness, no matter what the original stock may be.

Given a selected community of superior or supernormal individuals. They reproduce at all ages at which reproduction is possible, and the distribution of that reproduction is substantially the same as the distribution which existed in the past in the stock from which the selected individuals were taken. The result is that in a few generations the descendants of the selected individuals cover the same mental territory as that covered by the original stock. No ultimate change has taken place.

Given another selected community of inferior or subnormal individuals. They also reproduce at all ages at which reproduction is possible, and in the same distribution as that which previously existed. The result is that in a few generations the descendants from this subnormal group are no different from the general stock from which their ancestors were removed.

This is no fancy sketch based on imaginary results coming from reproducing at particular ages. The effect of age in parents has been extensively investigated and very definite and positive results have been found. Furthermore, the identical experiment has been tried on human beings on a very large scale and has been found to accomplish nothing.

For several hundred years England has picked her supermen and raised them to the peerage. The sons and daughters of these supermen have married the children of other supermen, and titles have been handed down from generation to generation to the descendants of these picked men. Yet the hereditary members of the British peerage are not one whit better than other well-educated Englishmen. Even the continued selection of other supermen from the general stock and the addition of their blood to the stock previously selected has not served to raise the British peer above the fairly good stock of other countries.

More than a hundred years ago England commenced picking out her subnormal stock—convicts and criminals of various kinds—and shipping them by the thousands to Australia and Tasmania. The convicts and criminals raised families, and their sons and daughters married the children of other convicts and criminals. Australia is not to-day a country filled with degenerates and defectives of various kinds. The Australians are a progressive part of the Anglo-Saxon stock, and that part will compare favorably with other parts anywhere in the world.

The attempt to improve the human race by killing off the inferior part, and then permitting the superior part to revert, is futile. It gets nowhere because it takes no account of those forces which act to produce the superior and the inferior. Instead of sitting by helplessly waiting for it to rain, let us suppose that we do a little irrigating. Let us suppose that we make a little intelligent application of Nature's forces and see what we get.

Without going into the scientific aspects of the situation, there is one general fact bearing on the matter, and that fact is easily seen and easily understood. Inferior stock is produced and maintained by continual reproduction by young parents. Superior stock is produced and maintained by continued reproduction by mature and comparatively old parents. A shift in the proportionate production of inferior and superior stock may be obtained quickly by simply raising the average age at which reproduction takes place.

Nearly all states permit minors to marry, and at least twelve states in the United States permit a fourteen-year-old boy to marry a twelve-year-old girl. Many minors marry, and many children have minors for parents. Each production of that kind is a step downward, and when the process is repeated for a second generation the result is inevitably subnormal or worse. Whether it takes one, two or three generations to get down to the actually feeble-minded, depends upon how good the original stock was and how youthful the parents were. The first and most obvious method of improving the race is to reform the marriage laws or to create a public sentiment which will curtail the production of children by parents who are themselves little more than children.



## GENERAL ARTICLES.

## A SERO-ENZYME STUDY OF BACTERIAL PROTEINS.\*

By HERBERT C. WARD, M. S., of Detroit.

Abderhalden's stimulating demonstration of the existence of sero-enzymes has reacted most effectively by opening up new lines of investigation in chemistry and serology. No advancement, however, has been made over the masterly alignment of facts set forth by Ehrlich in his effort to explain the operation of the laws governing immunity. The apparent ease with which Abderhalden's methods of dialysis could be applied to the needs of immediate diagnosis in pregnancy, has unfortunately led many of us to accept our demonstrations of enzyme specificity in other conditions regardless of consequences.

The rationale of the dialysis method is quite elementary and dependent upon the fact, that protein molecules are, as a rule, colloidal in character and therefore retained by animal, plant, or physically produced membranes. On the other hand, numerous chemical units derived from these molecules are capable of passing such barriers. When proteins belonging to a definite chemical group are introduced into the body, it can be shown that they stimulate the development of correlative enzymes, and these in turn bring about the decomposition of the proteins into their dialysible fractions.\*\*

The report of previous attempts to prove this method valuable in the diagnosis of infectious diseases has stimulated the present inquiry. Do the conditions permitting the successful application of this method in the diagnosis of pregnancy exist during the progress of a bacterial infection? Our assumption maintains that infectious processes are accompanied to a certain degree by a protein invasion. Bacterial proteins stimulate the production of specific enzymes and these react in turn by lysis of the proteins. Each type of protein produces a specific enzyme which is capable of homologous action

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\*\*This experimental work was carried on nearly two years ago, and since then scientific opinion has suggested the probability that foreign proteins parenterally introduced undergo no lysis themselves, but act rather as keys to unlock enzymic decomposition of the protein constituent of the blood serum itself. The amino acids of our dialysates come, therefore, from the homologous serum and not from the bacterial proteins of our artificial infections.

only, so that a certain protein undergoing pronounced lysis indicates the character of the infection and determines the diagnosis.

In the present study rabbits were injected with various bacterial extracts, and two preparations of diphtheroid and gonococcal cells were employed.

The *first* preparation consisted of washed cells. Established strains of bacteria were cultivated on a suitable medium to a maximum growth, removed, and washed repeatedly until free from soluble proteins. This media was then dried or held in heavy suspensions.

The *second* contained all the filterable products of bacterial growth, together with those present in the original medium and those broken down from the same. There was practically nothing of the same nature which made up the bulk material of the washed cell residue of the first lot. All these preparations were preserved with 0.2 per cent. trikresol, stored at 10° C., and with but one exception have remained sterile up to date.

Healthy male rabbits were selected as best adapted for the work, and duplicate animals used for each special series of cells, and filtrate preparations. Daily records of thermal and local reactions were kept. Injections began after a normal temperature average was recorded. Inoculations were made subcutaneously, and with three exceptions all of the animals survived the injection series. The final tolerance to large doses has been accepted as evidence of a certain degree of immunity.

The animals assigned to the study of the action of the diphtheria toxin received seven graduated injections during a period of twenty days. The first dose began with 0.05 c.cm. and the last injection amounted to 4.0 c.cm. The local reaction was slight at first, necrosis developed with the third injection, but with the sixth the reaction was negative. However, both animals lost weight gradually and died in eight weeks. Thermal reactions were clearly evident. In the animals receiving the washed cells, the first injections began with 10 mgrm., while the last was recorded at 500 mgrm. Marked congestion developed around the areas of injection, and subcutaneous nodules would often persist for a week or longer. No marked thermal reactions appeared at first, but toward the last week the temperature went up and remained high, gradually falling with cessation of the experimental treatment.

In the gonococcus series, we found that six injections were given during a period of four weeks. The doses were graduated from 1 c.cm. (the same dosage applying to both preparations) to 7 c.cm. The rabbits treated with the filtrates showed only a mild congestion. During the last third of the experiment, this increased in intensity, and around the areas of injection extensive open unhealing ulcers developed and remained so for three weeks following.

The gonococcus-cell duplicates showed greater variations in temperature than did those of the other series. The negative phases following immediately after the initial dose were quite noticeable. In one case death ensued two days after the third injection. The local reactions showed congestions and swellings, developing into open ulcers which refused to heal. This result was duplicated in the rabbits that had received the gonococcus filtrate preparations.

When we consider the method of determining the enzyme titre of the rabbits' sera, it is easily apparent that the results together with their interpretations are absolutely dependent upon the working conditions.

The rabbits were bled at 10:00 a. m., twenty-four hours since their last feeding. Samples of serum were obtained from two to five days following injections. Blood was taken from the ear veins in amounts of 5 to 10 c.cm., centrifuged, separated, and transferred to low temperature conditions until used at 5:00 p. m.

The bacterial proteins were prepared as follows: Mass culture growths were repeatedly washed in sterile salt solution and centrifuged until the supernatant liquid gave no reaction with the ninhydrin test. The sediment was then mixed with fresh solution to a uniform degree of density, measured by its gross appearance, fluidity in a fine pipette, and comparable amounts of weighed dried cells. To prepare the dried proteins, the bacterial sediment was evaporated at 37° C. for forty-eight hours, ground to a fine flour and stored under vacuum. The stability of these bacterial preparations was gauged from time to time.

In setting up the dialysing test, standard parchment thimbles were placed in glass-capped tubes. A few c.cm. of sterile distilled water were added and covered with toluol. Measured amounts of serum were placed inside these thimbles and then the bacterial protein of the washed cells. This was overlaid with a toluol film. Records of each thimble content combination were made and the series incubated at 37° C. for sixteen hours. The dialysates were then analyzed in duplicate sets, employing the ninhydrin reaction.

Mention can be made of only an important point or so of the technique. The method of heating the thimbles just before using and after each test was as follows. After washing, the thimbles were heated gradually to a temperature of 75° C. during a period of thirty minutes and then cooled during thirty minutes. Attention was thus given to graduating all changes of temperature with the idea that relative irregularities of expansions and contractions would find better adjustment. With such care, the parchment thimbles have retained their relative permeability during the course of some twenty dialysing series.

A second point considers the ninhydrin test. Instead of using 5 c.cm. of dialysate plus 0.1 c.cm. of ninhydrin solution, 2 c.cm. of



dialysate and 0.05 c.cm. of the reagent were found to yield comparable results. For uniform heating we have employed a glycerine bath maintained at a temperature of 130° C. The time of complete exposure was five minutes. By this means the control of the initial heating and the uniform concentration of the boiling solution were more easily accomplished.

For recording the various results of the tests, a scale of colors was prepared.

Standard dilutions of seiden peptone were made and with each dilution a triplicate set of ninhydrin tests. The means of these resulting shades of blue were used to determine the corresponding shade of neutral litmus solutions, and a series of tubes containing samples of these litmus solutions was made up. In our color standard, the most intense reaction corresponded to that obtained with the ninhydrin test upon a 1-1000 solution of peptone. This was number 1, and the series ran from 1 to 10, ten being absolutely colorless. The color reactions have been recorded by comparison of the test tubes with the standard series, as 1, 4, 7, 9, etc.

In studying, the results obtained in the series of rabbits which had received injection of diphtherial proteins, it was noticed that in the majority of the records positive color reactions were nearly always present. Anticipation of such reactions clearly showed the need for a control of every test.

I.—TABLE OF COMBINATIONS.

	Amt. of Serum.	K. L. Protein.	Strep. Protein	Results. 1-intense-10-colorless-Pos.-Neg.
Serum of Rabbits Treated with K.				
L. Protein No. 505.....	0.3	.2	0	5
	0.3	0	.2	0
	0.3	0	0	0
Serum of Rabbits.....	0.3	.2	0	0
Normal No. 300.....	0.3	0	.2	0
	0.3	0	0	0
K. L. Protein.....	0	.2	0	0
Strep. Protein.....	0	0	.2	0

Such a record indicates an ideal Positive Reaction. Contrast this ideal condition with an actual report.

II.—TABLE OF COMBINATIONS.

	Amt. of Serum	K. L. Protein	Strep. Protein	Results	
No. 505 K. L. Serum.....	0.3	0.1	0		2
	0.3	0	0.1		5
	0.3	0	0		7
No. 300 Normal.....	0.3	0.1	0		2
	0.3	0	0.1		4
	0.3	0	0		8
K. L. Protein.....	0	2	0		0
Strep. Protein.....	0	0	2		0

In analyzing the results obtained in this series, we must bear in mind, therefore, that various degrees of reaction were always present. When the strength of the tests made from thimble sets containing K. L. proteins is compared with those of the control thimbles containing homologous serum only, there is present a suggestive increase in the relative strengths of the reactions in the protein thimbles. The amino acids produced in the protein sets are increased remarkably over those of the *serum alone* controls.

When the *normal serum* controls are considered, there is no increased titre of amino acids in the sets containing protein and the serum of untreated rabbits as compared to treated sera. When the control test on the protein of streptococcal cells with all the sera is compared, no specific titre can be observed.

In the records of the series of tests made upon the sera of these rabbits receiving injections of gonococcus proteins, a parallel study yields very comparable results. Increased attention to the technique make this last series the most valuable. The percentage of error was greatly reduced, the reactions graded more carefully, and the results were satisfactory. The findings are, however, negative. Using the same tabulation, the same alignment of facts occurs. The tabulation of results obtained by one series in the case of the gonococcus washed-cell-proteins and the corresponding diphtheria set is here included.

III.—TABLE OF COMBINATIONS. (Gonococcus Proteins.)

Sera taken within 48 hours following 4th injection series.

Gon. Series			Sera	Gonococcus	K. L.	Ninhydrin	
(Washed cells.)			Amt.	Protein	Protein	Tests	Notes
No. 1.	Rab.	518...	0.3	0.5	0	6	Duplicate
No. 2.	Rab.	518...	0.3	0.5	0	5	
No. 3.	Rab.	518...	0.3	0	0	6	
No. 4.	Rab.	517...	0.5	0.2	0	7	Protein Control
No. 5.	Rab.	517...	0.5	0	0.1	5	
No. 6.	Rab.	517...	0.5	0	0	7	
(Filtered Protein)							
No. 7.	Rab.	513...	0.3	0.2	0	4	Protein Control
No. 8.	Rab.	513...	0.3	0	0.1	8	
No. 9.	Rab.	513...	0.3	0	0	6	
No. 10.	Rab.	513...	0.3	0	0	6	
No. 11.	Rab.	520...	0.3	0.2	0	5	
No. 12.	Rab.	520...	0.3	0	0	0	
(K. L. Washed Cells)							
No. 13.	Rab.	505...	0.3	.2	0	6	Non-specific
No. 14.	Rab.	505...	0.3	0	0	8	Serum Control
No. 15.	Horse Serum		0.4	0.2	0	5	Non-specific
No. 16.	.....		0.4	0	0	6	Serum Control
No. 17.	Control 1..		0	0.5	0	0	Protein
No. 18.	Control 2..				0.1	0	Stability Test.

A study of this reveals negative findings.

According to the results in Table III, the sera of these treated animals is no more active upon their specific bacterial substrates (see No. 4) than upon the other specific proteins (see No. 5). These sera are no more active on gonococcal proteins than is the sera of animals treated with a different protein (see No. 13).

Throughout the entire table, however, there is strong evidence of amino-acid formation taking place wherever serum and protein are in contact (See Nos. 5, 7, 11, 13). Various proteins therefore appear to be active on rabbit serum. For our main study, Table B shows negative findings.

#### IV.—TABLE OF COMBINATIONS. (Diphtheroid Protein.)

Sera taken five days following 5th injection series.

K. L. Series	Sera Amt.	K. L. Protein	Strep. Protein	Ninhydrin Tests	Notes
No. 1. Rab. 500... (Toxins)	0.2	0.2	0	6	Duplicate
No. 2. Rab. 500...	0.2	0.2	0	6	
No. 3. Rab. 500...	0.2	0	0	8	
No. 4. Rab. 504... (W. Cells)	0.1	0.2	0	6	Protein Control
No. 5. Rab. 504...	0.1	0.2	0.1	6	
No. 6. Rab. 504...	0.1	0	0	8	
No. 7. Rab. 505... (Duplicate)	0.1	0.2	0	8	
No. 8. Rab. 505...	0.1	0	0	8	
No. 9. Rab. 514... (Untreated)	0.1	0.2	0	5	Marked Positive Reactions
No. 10. Rab. 514...	0.1	0	0	0	
No. 11. Rab. 525... (Untreated)	0.1	0.2	0	4	Marked Positive Reactions
No. 12. Rab. 525...	0.1	0	0	0	
No. 13. Control....	1.0	0.2	0	0	Protein Stability
No. 14. Control....	2.0	0	0.1	0	Protein Stability

Marked positive reactions obtained from the sera of untreated animals, Nos. 9 to 12, indicate the negative character of this entire series.

As in table No. 3, wherever serum and protein were in contact, as in thimbles Nos. 1, 2, 4, 5, 9 and 11, there is evidence of amino acid formation; whereas in control thimbles containing either bacterial protein or sera alone, specific or non-specific, no such formation developed.

In reviewing the entire series of this experimental work, it is evident that the conditions should permit of satisfactory conclusions. Bacterial proteins, specific biologically, together with their derivatives, have been carefully employed. Injections have simulated, to



a certain extent, avenues of a natural infection, physiologically speaking. Susceptibility to and a definite degree of immunity against these proteins was to be found in the thermal and tissue reaction records. Control agglutination tests were 1-500 in the single case of the animals receiving the gonorrheal washed cells. Repeated sero-enzyme titres have not given definite evidence of any specific response on the part of the tissue to the introduction of the foreign proteins.

Such negative findings are consistent with the assumption that the sero-enzyme response becomes apparent when foreign proteins of a relative high constitutional complexity enter into an extensive physiological engagement with the tissues. By employing subcutaneous methods of injection, the field of action is greatly limited, and this is, we believe, comparable to natural conditions of infection in the case of diphtheroid and gonococcal infection. Proteins introduced in small amounts subcutaneously do not create a measurable sero-enzyme titre. High grade proteins introduced intravenously would be degraded theoretically through such a production. Low grade proteins introduced intravenously would not require the same enzyme activity to the same degree. Logically, they would require but a small fraction of that energy or even suffer further disintegration under the stimulus of common enzymes more or less inactive upon their previous structural units. If a given amino acid may be derived from the proteid constituents of egg albumin and also from those making up diphtherial cells for instance, and were we to introduce this common protein derivative into the tissues of an animal, would the sero-enzymes developed be specific for egg albumin or for diphtherial protein, or for this split product only? Why should the tissues react to develop high grade enzymes for a low grade protein invasion? The logic of physiological economy suggests otherwise. Therefore, in view of the above incompletely expressed assumption, the negative results are consistent with the experimental work in our effort to call forth an enzymic titre from tissues which did not need such so-called protection.

We have observed that experimental animals have received increased amounts of proteins up to ten- and fifty-fold. After the first injection positive immunity has been established, but no measurable enzymic response has developed in proportion to the injection series.

Theoretically there should be such a response. This failure to demonstrate a proportionate development of sero-enzymes specific or a general development over the control titrations of untreated animals, stands in striking contrast to the bactericidal, agglutinative and opsonic titrations in experimental animals subjected to a parallel series of injections.

The conclusions of this study with reference to the purpose of taking it up, as outlined in the first inquiry, are as follow:—

1. The sero-enzyme test does not appear from these experiments to be of diagnostic aid in such bacterial infections.
2. The conditions which are believed to exist in the sera of

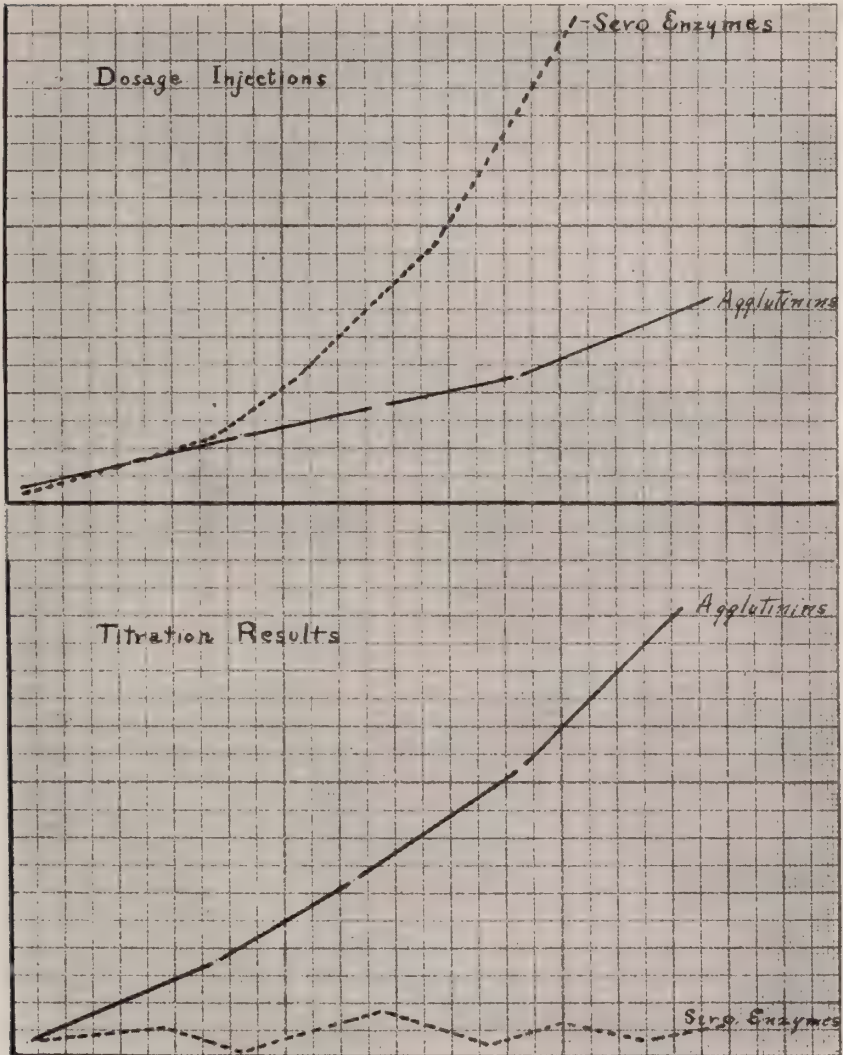


Chart I.—Illustration of Comparative Valuation of Serological Titrations.

pregnant patients do not exist in any measurable degree in the case of diphtheria and gonococcus experimental infections in rabbits.

3. Neither proteins of a higher constitutional grade nor those less complex excite a measurable specific sero-enzyme response in rabbits.

## CERTAIN MEDICAL CONSIDERATIONS OF GASTRIC AND DUODENAL ULCERS.

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It is contended by many surgeons that patients with gastric and duodenal ulcers have conditions of which it may be said that "he who runs may read." Published statements from some of the great surgical clinics of the world affirm that the diagnosis of gastric and duodenal ulcers is easy almost to absurdity, that the symptoms are quite typical, and easily interpreted. There is not much question that this surgical view of the ease of diagnosis can be explained as follows: The surgeon sees and operates advanced or end cases only, or at least such cases form the vast majority of his operative material. It is quite true that such late or advanced cases often have a characteristic symptomatology. It does not follow from this, however, that patients who come to the medical man early in the course of their afflictions fall invariably into the easy and simple clinical picture charted by the surgeon. Every medical man constantly sees patients presenting symptoms which bring up the suspicion of gastric or duodenal ulcers, and in whom a definite and positive diagnosis cannot be made, even after every diagnostic resource has been exhausted. The diagnosis may remain *sub judice* in some of these patients, even after long periods of observation. This class of patients does not usually fall into surgical hands, and for that reason statistical figures are not so available.

There is doubt in the writer's mind whether many series of statistics on ulcer based on non-operated patients should not be open to criticism. The reason for this is the not infrequent failure to find ulcer at operation in patients in whom it had been definitely diagnosed, and also the accidental finding of ulcer in patients operated for some other condition. It is extremely difficult to say what is the minimum of evidence required to make a diagnosis in the absence of the cardinal symptoms and signs. Even the so-called cardinal symptoms and signs are not infallible. Moynihan makes the statement in his book, that any recurrent hyperchlorhydria means ulcer. It is difficult to accept this dictum. I have now under observation a woman of this type who has been repeatedly examined by all known methods, including the roentgen ray, and although the hydrochloric acid in the stomach is always above 100, data enough to make a definite diagnosis of ulcer are lacking. It



is meant by this that the data should be sufficient to justify the medical man to advise operation in an otherwise intractable case. It has been said that in typical cases failure of diagnosis should not occur, which is doubtless true. This surgical type of patient, however, does not harmonize with many of the conditions constantly seen by the medical man doing much of this work.

The difficulty in making a diagnosis in some of these obscure or atypical cases, makes it imperative that every means of examination be utilized. A proper history is generally conceded to be the most important individual means of arriving at a diagnosis. This is time-consuming, but absolutely essential. The patient should be specifically questioned on each possible symptom. A distinction may be made with advantage between symptoms which have diagnostic value, and those which are merely descriptive of the patient's symptoms. Very little real information will be obtained from questioning, however close, concerning such symptoms as belching, gas eructations, feeling of fullness, distress or burning. The essential points to be elaborated are duration, periodicity, pain, vomiting, methods of securing relief, bleeding, and weight changes.

The onset of the patient's disturbance is almost invariably before the time first mentioned by the patient. Having pinned the patient down to accuracy on this point, it is very illuminating to trace the curve of disturbance through successive years in regard to periodicity. This should precede a closer analysis of individual symptoms. Periodicity is more noteworthy in duodenal than gastric ulcers. It is certainly true that remissions or even intermission of symptoms may occur in ulcer histories, but the same thing can often be demonstrated in other conditions. Particularly in reflex symptoms from chronic appendicitis will such remissions be noted. In the group of atypical cases which is being considered in this article, periodicity will not be found, in the last analysis, to be of deciding value.

Pain as a symptom should be analyzed with great care. Every effort should be made to have the patient differentiate real actual pain which hurts, from various other feelings or sensations of discomfort, such as burning, fullness, distress, or heaviness. This is really difficult, but when it has been done with all due appreciation of neurotic tendencies to misrepresentation or exaggeration, then it may be said that the examiner has a real clue to an ulcer in a patient in whom the condition is suspected. When real pain is determined, the qualifying factors of location, food relationship, methods of relief, postural effects can be worked out.

The absence of the characteristic classic textbook relation of pain to food, that is, one hour after in gastric, and three hours after in duodenal, ulcers, should in no way militate against the presumption of ulcer. The pain may come during the course of the meal, may awaken the patient from his sleep at night, in fact at any time. The

location of the pain is not of primary importance. Gastric pain is more often in the epigastrium, but more important than this localization is a sharp demarcation of its limits, especially if small and permanent at successive examinations. It is the writer's custom to determine these limits by means of one hand percussion and mark them out as accurately as possible with a blue pencil. In duodenal ulcer, limited areas of pain are common enough in late and typical cases, but are very often absent in early and atypical forms. The area over which subjective pain is felt does not always correspond to the tender spots on palpation. Speaking in general terms, duodenal pains are more vague than gastric pains. The so-called duodenal area is roughly about  $1\frac{1}{2}$  to 2 inches above the navel, and  $1\frac{1}{2}$  inches to the right of the midline. This area is indefinite, vague and shifting. It is important to emphasize that pain anywhere in the upper abdomen is not inconsistent with a diagnosis of ulcer. The pain may indeed be absent in front, or be but slight, while present over the back.

The relation of the pain to posture and pressure is not of primary importance. Relief may be obtained from posture more frequently in gastric than in duodenal ulcers. The only importance of postural relief from a diagnostic point of view is that it may sometimes evidence the real pain suffered in the frenzied attempts to gain relief. I mention in passing a patient of mine, the wife of a physician, who finally learned that she could get postural relief by literally standing on her head. Such bizarre attempts at relief have value in differentiating real, actual pain from the other gastric sensations mentioned above. The relation of pain to pressure is of limited value. In a general way, ulcer pain is made worse by pressure in contradistinction to some forms of colic.

The means employed by the patient to get relief are not of primary importance in a diagnostic way. Relief from soda may be more or less common in all types of stomach disease. Comparatively few ulcer patients have pain so severe that hypodermics of morphine are necessary. Vomiting, self-induced or otherwise, may give relief, but the same thing is true of individual cases of all types of stomach disease. Early ulcers of the lesser curvature are apt to produce more vomiting than ulcers elsewhere in the absence of complications. Bile is not a common constituent of the vomiting of early ulcers.

The atypical cases of ulcer herein considered often show no bleeding after the most careful examination. A distinction should be sharply drawn between a history of bleeding and blood actually found by the physician. It is quite common to get a history of blood in the vomitus or stool, but the actual presence of blood in the vomitus, stomach contents, or stool, after extraneous sources have been excluded, is much less common. The absence of a history

of bleeding in no way speaks against the presence of ulcer. Blood in the vomitus does not necessarily mean that its source is in the stomach. It may come from the throat, nose, esophagus, lungs, or duodenum.

Loss of weight in patients with ulcer is not characteristic. It has little value as a diagnostic sign.

The roentgenological findings occupy an important place in the list of diagnostic methods, but must rank in value below the well-taken history. This subject cannot be considered here, but every effort should be made to subject all patients with gastro-intestinal trouble lasting more than a reasonable time to this means of examination. The roentgen ray has its limitations in this field, and it is well to have the patient understand that by itself the findings may not be conclusive.

The physical examination of the patient often shows but little in these early and indefinite cases. Late surgical types show more, and one may determine hypersecretion, food retention, tumor and visible peristalsis. Tenderness on palpation will most often correspond to the location of pain mentioned in the history. However, there may be tenderness without spontaneous pain, which may be one of the first clues to the diagnosis. This area of tenderness may be most variable in its location in different patients, but may be entirely absent in the presence of ulcer. Chemical and microscopical examination of the gastric contents should not be omitted, but the findings are often corroborative rather than diagnostic. Examination of the duodenal contents has not yet come into general use, and it is doubtful if it will prove to be of much aid in making a differential diagnosis.

After all the data possible have been obtained by the methods mentioned above, the differentiation of ulcer from other conditions may be considered. Snap-shot diagnoses of ulcer are often correct in late surgical types, but unfortunately this does not obtain in the early and indefinite cases herein considered. Chronic appendicitis may produce many confusing symptoms. Pyloric spasm and epigastric pain may be the only disturbance in chronic appendicitis. There may be no spontaneous pain whatever over the appendix region, rigidity is often lacking, and tenderness on palpation may be general or variable in its location. Especially important in this connection is the complaint by the patient that he has similar epigastric disturbance, distress, or pain when the roentgenologist exercises pressure over the region where he finds the appendix. In chronic appendicitis, there may be more or less obliteration of the lumen from previous acute attacks, strictures, fecal concretions, or adhesions; periodicity may be especially noticeable in chronic appendicitis, producing reflex disturbances. Gastric symptoms may be produced by the action of congenital bands



and membranes persisting in the right iliac fossa. Mayo states that gastric hemorrhage has been noted in 2 per cent. of all cases of chronic appendicitis with the gastric reflex.

Gall-bladder disease is extremely difficult to differentiate in atypical and uncomplicated cases of ulcer. The more or less typical cases of gall-bladder disease with distinct pain in the gall-bladder region, evidences of infection, such as chills, sweats, joint pains, increased white count, and headaches, are not here to be considered. There is another group of gall-bladder diseases with gastric symptoms, simulating ulcer, which may be differentiated with the greatest difficulty or not at all. Gall-bladder pain is said to have no relation to the taking of food, but the same thing is true of many early ulcers. The pain or distress in either gall-bladder disease or ulcer may follow light foods, as milk, or heavy meals, so this may be of diagnostic moment only in a general way. The disturbance from gall-bladder disease may not necessarily be short and transient, but may persist for long periods of time. Vomiting, especially of bile, may not be present in these obscure cases of gall-bladder disease. Constipation is of no value as a symptom favoring gall-bladder disease, as it is more or less universal. Gastric hemorrhage is said to occur in 5 per cent. of the cases of chronic gall-bladder disease from a "primary follicular ulceration of the gastric and duodenal mucosa."

A gastric neurosis may be the stumbling-block in the way of a positive diagnosis, and the bar to a prospective operation. In favor of a neurosis is the general status of the patient when suggestive of this condition, rather than any localized signs referred to the abdominal region. Aggravation of the disturbance under stress, strain, or emotion, is to be elicited; also extreme variability in the clinical picture. Organic lesions are more apt to run true to a certain type in a given case. Cold applications are said to bring on gastric disturbances in neurotic individuals so inclined.

The diagnosis of ulcer in a patient previously operated may present insuperable obstacles. Omental adhesions may drag on the stomach and present very confusing symptoms. Definite rules for our guidance in operated cases cannot be laid down.

The differential diagnosis from a chronic pancreatitis has to be considered, but its relative rarity is a point of weight.

Multiplicity of lesion occurs in fully 25 per cent. of ulcer patients. It is true, however, that this high percentage occurs in advanced and chronic cases coming to operation, the type of cases not particularly considered herein. The early and indefinite cases of ulcer do not come to operation so frequently, and data on this point can be obtained only at operation or autopsy. Appendicitis, mobile cecum, Lane's kink, gastro-intestinal adhesions, varying degrees of obstruction and stenosis, gall-bladder disease, and neurotic

conditions may be variously associated in a given case, and make such a thing as a positive diagnosis impossible.

It is very evident from what has been said that the actual diagnosis of ulcer is not at all easy, even with all our diagnostic resources, at the time when the surgeon says that he should have these cases. We have been told that the great mortality from gastric cancer could be lowered if ulcers in the stomach and duodenum were diagnosed and operated early. The surgeon is apt to forget the difficulties inherent in the diagnostic differentiation. To subject every early doubtful case to an exploratory operation does not seem quite justifiable. The writer wishes to admit readily that there are numbers of patients with ulcers in the stomach and duodenum who are being treated more or less blindly by the medical man and in whom the diagnosis could probably be made if all diagnostic resources at our command were utilized, but there is also a large group of ulcer patients in whom this is distinctly not so. It may be said that the ulceration in some of these difficult cases has not penetrated through to the gastric or intestinal serosa, and has not produced much infiltration or hypertrophy of tissue. It is open to question whether the surgeon can recognize all of these early erosions even after the abdomen is opened. It is not at all infrequent for the surgeon not to find ulcer at operation when all the clinical features point to its existence. Erosions without much infiltration are found with difficulty at autopsy, and are easily missed by the surgeon, even if the stomach or duodenum is opened. There is no uniformity of opinion among surgeons as to the proper procedure when ulcer cannot be demonstrated at operation. It is well to trust to the surgeon's judgment in a given case. Whether the proposed operation should be carried out when the ulcer cannot be demonstrated, is a moot question, and the medical man should exercise a certain amount of backward pressure on over-enthusiastic surgical tendencies in this respect. If definite criteria of ulcer, such as bleeding or barium fleck, have been previously determined, the proposed operation may be carried out, even if the surgeon cannot demonstrate the ulcer. This should be done, however, only where other lesions in the abdomen, which could have produced the trouble, are not demonstrable.

#### CONCLUSIONS

1. Statements from many surgical clinics that ulcers in the stomach or duodenum are easily diagnosed, does not hold good in many early, atypical cases seen only by the medical man.
2. The type of patient seen by the surgeon is a late, often complicated case, and here a typical clinical picture is often seen.
3. Ulcer statistics based on non-operated or non-autopsied cases are open to question.

4. The great difficulty often experienced by the medical man in making a diagnosis in these early cases, makes it imperative that all diagnostic resources at our command be utilized.

5. The well-taken history is the most important means of making a diagnosis. This requires time, care, and an analytical spirit.

6. The roentgen examination should not be omitted, but it alone may not lead to definite conclusions.

7. The differential diagnosis should consider chronic appendicitis, gall-bladder disease, gastric neurosis, chronic pancreatitis, adhesions, and multiple lesions.

8. Well-developed team work on the part of the medical man, surgeon and roentgenologist is essential for good work in handling this type of patient.

421 Michigan Street.



## IS THE GALL-BLADDER A USELESS AND FUNCTIONLESS ORGAN?

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The surgical literature of the last half of this decade seems to show a tendency on the part of surgeons to regard the gall-bladder as a mere functional appendage. This is a very radical exaggeration, to say the least. The gall-bladder is an organ performing several very important functions, and to regard it as a vestigial organ is unwarranted and unsurgical. To affirm that the gall-bladder is functionless, and to base this view on the fact that patients, whose gall-bladders have been removed, have shown no impairment of biliary or digestive function, is, to say the least, a very superficial way of ascertaining facts.

### PRINCIPAL FUNCTIONS OF THE GALL-BLADDER.

The gall-bladder secretes, in abundant quantities, a thin, transparent mucus, which serves to lubricate the common duct, thus rendering the passage of bile easier, and preventing irritation to the mucosa. The gall-bladder unquestionably serves to maintain uniform pressure in the hepatic and common ducts.

Murphy has very eloquently stated that the gall-bladder acts as a bulb in the maintaining of this uniform pressure. The bile is ejected into the duodenum synchronously with the peristaltic contractions of the gut. It seems therefore very clear that the gall-bladder acts by regulating the pressure and in storing away the superfluous bile to be ejected into the duodenum when the processes of digestion require it in greater amounts. The proof for these assumptions is not wanting. It has been noted with striking frequency that the common duct is found to be dilated after cholecystectomy. I have for several years made examinations of the common duct in all cases of gall-stone impaction in the cystic duct, and I can say that I have never found a single case where the common duct was not markedly and in some cases immensely dilated. A few years ago I cholecystectomized about ten dogs. Twenty to sixty days following this operation, the abdomen was opened for the express purpose of examining the condition of the common duct. In every one I found the duct dilated, and in two dogs, the stump of the cystic duct had dilated in bulb fashion, showing the attempt of nature to create a pressure-maintaining bulb. This

phenomenon has been observed in the human, very frequently, by surgeons the world over. Another point that seems to substantiate these views, is the greater frequency of common duct stones after cholecystectomy, and in cases of impacted stone in the cystic duct, than in the ordinary cases of uncomplicated biliary concretions in the gall-bladder alone. There is not and there should not be any differences of opinion in regard to the clear indications for cholecystectomy, but I believe that a firm protest must be expressed against this unwarranted and over-enthusiastic widening of the proper field of this operation, in wanting to establish it as an operation of choice in all gall-bladder lesions. We are being led to regard the gall-bladder as another appendix. This teaching is unsurgical, unscientific and dangerous. If it was true that the gall-bladder serves absolutely no physiological purpose; if it was true that its removal causes no change in the biliary circulation; if it was established that the dilatation of the cystic duct, so frequent after cholecystectomy, was of no importance, and never would give rise to pancreatitis, or biliary cirrhosis of liver; if it was proved that not even a single case ever developed common duct stone after cholecystectomy, it would be unwise ruthlessly to sacrifice a curable gall-bladder for the following reasons:—

1. The patient may in the course of his lifetime develop a biliary cirrhosis, which as it has been demonstrated, is immensely benefited by biliary drainage.

2. A malignant process of the head of the pancreas or stomach may develop later in life, causing common duct obstruction, which can only be relieved by anastomosing the gall-bladder into the duodenum or jejunum. And how can anyone be certain that a patient may not later in life develop a chronic interstitial pancreatitis, and with the gall-bladder already removed, be thus deprived of the benefits of biliary drainage, which have been proved to be so very satisfactory in this affection?

It is not the purpose of this paper to discourage the surgeon from removing the gall-bladder when this operation is clearly indicated. To drain a gall-bladder that should be removed is a useless procedure, but the indications for cholecystectomy should be clearly defined. In chronic interstitial cholecystitis and other chronic gall-bladder infections, in which the mucosa is destroyed in many places and the gall-bladder has become a non-contractile viscus, drainage is absolutely of no avail, cholecystectomy alone giving us the best opportunity for a satisfactory result.

In acute cholecystitis and empyema of the gall-bladder, I invariably do a cholecystostomy. While it is certain that some of these cases may later on require a cholecystectomy for a functionless diseased gall-bladder, I believe that to do so primarily at the time of the acute infection is unwise. The mortality must

necessarily be much higher than with simple cholecystostomy, especially if there is a diffuse angiocholitis complicating the gall-bladder infection.

These remarks apply as well in gangrenous cholecystitis. While my experience is necessarily limited, I have been impressed by the fact that the gangrene area never involves the whole organ, and by the remarkable recuperative power of the gall-bladder wall, when aided by cholecystostomy performed early after the onset of the disease.

Some of these cases have required later a cholecystectomy, but the majority have not, and I do believe that the mortality will be lower by removing the gall-bladder in a secondary operation, if absolutely necessary, in this type of lesions.

In cases of stone impacted in the cystic duct, the gall-bladder should be removed every time. The trauma incident on removal of the stone may lead to cystic duct stricture with a most annoying train of symptoms, which invariably leads to cholecystectomy later on.

Obviously no remarks need be made in regard to a gall-bladder suspected of malignancy. The urgency of a radical removal is sufficiently impressed on our mind.

The large number of papers that have appeared in the last few years, extolling cholecystectomy as the operation of choice in all gall-bladder lesions, and the extreme views held by some authors in regarding the gall-bladder as a functionless appendage, have caused me to believe that it is timely and befitting to take a more conservative view of the question.

The gall-bladder is not a functionless organ. Cholecystectomy performed as a routine, especially as advocated in simple cholelithiasis, is unjustifiable and unphysiological. Cholecystectomy has a well-defined field. To widen this field without scientific and physiological consideration is unsurgical, for truly great surgery is conservative, and radical only when unredeemable pathological lesions force her hand to summary action.



## SPECIAL ARTICLE.

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### 'LITTLE CLASSICS' PHYSICIANS MAY HAVE OVERLOOKED.

[It may be true that to-day the name of Rudyard Kipling is not on our lips as often as it was some years ago; but even though we do not read Kipling and quote Kipling in the way we did when his first successes in literature were chronicled in all our leading literary journals, this does not mean that we have forgotten what we owe this genius. Who can forget the impression made on all readers of the 'better' sort when "Plain Tales from the Hills" appeared, or the delight and profit from reading "The Light That Failed," "The Jungle Books," and "Kim," works which by means of the literary art of the author brought us face to face with the India of to-day,—its tattered garment and also its strivings towards being a modern state. Here were virility, audacity, a new point of view, a candor which some supersensitive critics immediately pronounced vulgar, and a remolding of the English language, all in one young man who wrote because he had to and not because he had been trained and emasculated by any set rules handed down by an older writer. True, Bret Harte had written his Western tales years before, and it may have been that the young Anglo-Indian had read "The Luck of Roaring Camp" and "The Outcasts of Poker Flat" with profit; but, even so, his first volume and all the succeeding volumes were of the first order as regards a new voice in literature—a voice that was not always sweet but had something much better than a saccharine quality: honesty of purpose and a ring that was robust and martial. Thus spake Kipling to us, and whether he spoke in prose or in poetry, we were held fast by the mastery of a literary gift that was astonishing.]

In the story which we present this month the Kipling of former days is again evidenced, the man who wrote "They" and "The House of a Hundred Sorrows" and "Christmas in India." It concerns itself with Nicholas Culpeper, he whom we deride to-day as an herbalist and astrologer-physician, but who during his life had a large following despite the fact that the 'scientific' members of the medical profession some two hundred and fifty years ago were not greatly enamored of his teachings. The herbalist believed that there was a close connection between the universe and man, the macrocosmos and the microcosmos, and that all herbs had their distinctive virtues, be they radish and laurel, antidotes to drunkenness, or white hellebore to "be given only with good heed and great advisement, those grieved in their stomachs should by no means deal with it." And though to-day we may laugh at the theory and practices of the herbalists, we must not forget that they were disciples of Aristotle, Hippocrates, and Galen.—LITERARY EDITOR.]

### A DOCTOR OF MEDICINE.\*

They were playing hide-and-seek with bicycle lamps after tea. Dan had hung his lamp on the apple tree at the end of the hellebore bed in the walled garden, and was crouched by the gooseberry bushes ready to dash off when Una should spy him. He saw her lamp come into the garden and disappear as she hid it under her cloak. While he listened for her footsteps, somebody (they both thought it was Phillips the gardener) coughed in the corner of the herb-beds.

'All right,' Una shouted across the asparagus; 'we aren't hurting your old beds, Phippsey!'

She flashed her lantern toward the spot, and in its circle of light they saw a Guy Fawkes-looking man in a black cloak and a steeple-crowned hat, walking down the path beside Puck. They ran to meet him, and the man said something to them about *rooms* in their head.

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\*From "Rewards and Fairies." By Rudyard Kipling. New York: Doubleday, Page & Co. 1910.

After a time they understood he was warning them not to catch colds.

'You've a bit of a cold yourself, haven't you?' said Una, for he ended all his sentences with a consequential cough. Puck laughed.

'Child,' the man answered, 'if it hath pleased Heaven to afflict me with an infirmity——'

'Nay, nay,' Puck struck in, 'the maid spoke out of kindness. I know that half your cough is but a catch to trick the vulgar; and that's a pity. There's honesty enough in you, Nick, without rasping and hawking.'

'Good people'—the man shrugged his lean shoulders—'the vulgar crowd love not truth unadorned. Wherefore we philosophers must needs dress her to catch their eye or—ahem!—their ear.'

'And what d'you think of *that*?' said Puck solemnly to Dan.

'I don't know,' he answered. 'It sounds like lessons.'

'Ah—well! There have been worse men than Nick Culpeper to take lessons from. Now, where can we sit that's not indoors?'

'In the hay-mow, next to old Middenboro,' Dan suggested. *He* doesn't mind.'

'Eh?' Mr. Culpeper was stooping over the pale hellebore blooms by the light of Una's lamp. 'Does Master Middenboro need my poor services, then?'

'Save him, no!' said Puck. 'He is but a horse—next door to an ass, as you'll see presently. Come!'

Their shadows jumped and slid on the fruit-tree walls. They filed out of the garden by the snoring pig-pound and the crooning hen-house, to the shed where Middenboro the old lawn-mower pony lives. His friendly eyes showed green in the light as they set their lamps down on the chickens' drinking-trough outside, and pushed past to the hay-mow. Mr. Culpeper stooped at the door.

'Mind where you lie,' said Dan. 'This hay's full of hedge-brishings.'

'In! in!' said Puck. 'You've lain in fouler places than this, Nick. Ah! Let us keep touch with the stars!' He kicked open the top of the half door, and pointed to the clear sky. 'There be the planets you conjure with! What does you wisdom make of that wandering and variable star behind those apple boughs?'

The children smiled. A bicycle that they knew well was being walked down the steep lane.

'Where?' Mr. Culpeper leaned forward quickly. 'That? Some countryman's lantern.'

'Wrong, Nick,' said Puck. 'Tis a singular bright star in Virgo, declining toward the house of Aquarius the water-carrier, who hath lately been afflicted by Gemini. Aren't I right, Una?'

Mr. Culpeper snorted contemptuously.

'No. It's the village nurse going down to the Mill about some fresh twins that came there last week. Nurse,' Una called, as the light stopped on the flat, 'when can I see the Morris twins? And how are they?'

'Next Sunday, perhaps. Doing beautifully,' the Nurse called back, and with a *ping-ping-ping* of the bell brushed round the corner.

'Her Uncle's a vetinary surgeon near Banbury,' Una explained, 'and if you ring her bell at night, it rings right beside her bed—not downstairs at all. Then she jumps up—she always keeps a

pair of dry boots in the fender, you know—and goes anywhere she's wanted. We help her bicycle through gaps sometimes. Most of her babies do beautifully. She told us so herself.'

'I doubt not, then, that she reads in my books,' said Mr. Culpeper, quietly. 'Twins at the Mill!' he muttered half aloud. "'And again He sayeth, Return, ye children of men.'"

'Are you a doctor or a rector?' Una asked, and Puck with a shout turned head over heels in the hay. But Mr. Culpeper was quite serious. He told them that he was a physician-astrologer—a doctor who knew all about the stars as well as all about herbs for medicine. He said that the sun, the moon, and five Planets, called Jupiter, Mars, Mercury, Saturn, and Venus, governed everybody and everything in the world. They all lived in Houses—he mapped out some of these against the dark with a busy forefinger—and they moved from House to House like pieces at draughts; and they went loving and hating each other all over the skies. If you knew their likes and dislikes, he said, you could make them cure your patient and hurt your enemy, and find out the secret causes of things. He talked of these five Planets as though they belonged to him, or as though he were playing long games against them. The children burrowed in the hay up to their chins, and looked out over the half door at the solemn, star-powdered sky till they seemed to be falling upside down into it, while Mr. Culpeper talked about 'trines' and 'oppositions' and 'conjunctions' and 'sympathies' and 'antipathies' in a tone that just matched things.

A rat ran between Middenboro's feet, and the old pony stamped.

'Mid hates rats,' said Dan, and passed him over a lock of hay. 'I wonder why?'

'Divine Astrology tells us,' said Mr. Culpeper. 'The horse, being a martial beast that beareth man to battle, belongs naturally to the red planet Mars—the Lord of War. I would show you him, but he's too near his setting. Rats and mice, doing their businesses by night, come under the dominion of our Lady the Moon. Now between Mars and Luna, the one red, t'other white, the one hot, t'other cold and so forth, stands, as I have told you, a natural antipathy, or, as you say, hatred. Which antipathy their creatures do inherit. Whence, good people, you may both see and hear your cattle stamp in their stalls for the self-same causes as decree the passages of the stars across the unalterable face of Heaven! Ahem!

Puck lay along chewing a leaf. They felt him shake with laughter, and Mr. Culpeper sat up stiffly.

'I myself,' said he, 'have saved men's lives, and not a few neither, by observing at the proper time—there is a time, mark you, for all things under the Sun—by observing, I say, so small a beast as a rat in conjunction with so great a matter as this dread arch above us.' He swept his hand across the sky. 'Yet there are those,' he went on sourly, 'who have years without knowledge.'

'Right,' said Puck. 'No fool like an old fool.'

Mr. Culpeper wrapped his cloak round him and sat still while the children stared at the Great Bear on the hill-top.

'Give him time,' Puck whispered behind his hand. 'He turns like a timber-tug—all of a piece.'

'Ahem!' Mr. Culpeper said suddenly. 'I'll prove it to you. When I was physician to Saye's Horse, and fought the King—or rather the man Charles Stuart—in Oxfordshire (I had *my* learning at



Cambridge), the plague was very hot all around us. I saw it at close hands. He who says I am ignorant of the plague, for example, is altogether beside the bridge.'

'We grant it,' said Puck solemnly. 'But why talk of the plague this rare night?'

'To prove my argument. This Oxfordshire plague, good people, being generated among rivers and ditches, was of a werish, watery nature. Therefore it was curable by drenching the patient in cold water, and laying him in wet cloths; or at least, so I cured some of them. Mark this. It bears on what shall come after.'

'Mark also, Nick,' said Puck, 'that we are not your College of Physicians, but only a lad and a lass and a poor lubberkin. Therefore be plain, old Hyssop on the Wall!'

'To be plain and in order with you, I was shot in the chest while gathering of betony from a brookside near Thame, and was took by the King's men before their Colonel, one Blagg or Bragge, whom I warned honestly that I had spent the week past among our plague-stricken. He flung me off into a cowshed, much like this here, to die, as I supposed; but one of their priests crept in by night and dressed my wound. He was a Sussex man, like myself.'

'Who was that?' said Puck suddenly. 'Zack Tutshom?'

'No, Jack Marget,' said Mr. Culpeper.

'Jack Marget of New College? The little merry man that stammered so? Why a plague was stuttering Jack at Oxford then?' said Puck.

'He had come out of Sussex in hope of being made a Bishop when the King should have conquered the rebels, as he styled us Parliament men. His College had lent the King some monies too, which they never got again, no more than simple Jack got his bishopric. When we met, he had had a bitter bellyful of King's promises, and wished to return to his wife and babes. This came about beyond expectation, for, so soon as I could stand of my wound, the man Blagge made excuse that I had been among the plague, and Jack had been tending me, to thrust us both out from their camp. The King had done with Jack now that Jack's College had lent the money, and Blagge's physician could not abide me because I would not sit silent and see him butcher the sick. (He was a College of Physicians man!) So Blagge, I say, thrust us both out, with many vile words, for a pair of pestilent, prating, pragmatical rascals.'

'Ha! Called *you* pragmatical, Nick?' Puck started up. 'High time Oliver came to purge the land! How did you and honest Jack fare next?'

'We were in some sort constrained to each other's company. I was for going to my house in Spitalfields, he would go to his parish in Sussex; but the plague was broke out and spreading through Wiltshire, Berkshire, and Hampshire, and he was so mad distracted to think that it might even then be among his folks at home that I bore him company. He had comforted me in my distress. I could not have done less. And I remembered that I had a cousin at Great Wigsell, near by Jack's parish. Thus we footed it from Oxford, cassock and buff coat together, resolute to leave wars on the left side henceforth; and either through our mean appearances, or the plague making men less cruel, we were not hindered. To be sure they put us in the stocks one half-day for rogues and vagabonds at a village under St. Leonard's forest, where, as I have heard,

nightingales never sing; but the constable very honestly gave me back my Astrological Almanac, which I carry with me.' Mr. Culpeper tapped his thin chest. 'I dressed a whitlow on his thumb. So we went forward.

'Not to trouble you with impertinences, we fetched over against Jack Marget's parish in a storm of rain about the day's end. Here our roads divided, for I would have gone on to my cousin at Great Wigsell, but while Jack was pointing me out his steeple, we saw a man lying drunk, as he conceived, athwart the road. He said it would be one Hebden, a parishioner, and till then a man of good life; and he accused himself bitterly for an unfaithful shepherd, that had left his flock to follow princes. But I saw it was the plague, and not the beginnings of it neither. They had set out the plague-stone, and the man's head lay on it.'

'What's a plague-stone?' Dan whispered.

'When the plague is so hot in a village that the neighbors shut the roads against 'em, people set a hollowed stone, pot, or pan, where such as would purchase victual from outside may lay money and the paper of their wants, and depart. Those that would sell come later—what will a man not do for gain?—snatch the money forth, and leave in exchange such goods as their conscience reckons fair value. I saw a silver groat in the water, and the man's list of what he would buy was rain-pulped in his wet hand.

'“My wife! Oh, my wife and babes!” says Jack of a sudden, and makes up-hill—I with him.

'A woman peers out from behind a barn, crying out that the village is stricken with the plague, and that for our lives' sake we must avoid it.

'“Sweetheart!” says Jack, “Must I avoid thee?” and she leaps at him and says the babes are safe. She was his wife.

'When he had thanked God, even to tears, he tells me this was not the welcome he had intended, and presses me to flee the place while I was clean.

'“Nay! The Lord do so to me and more also if I desert thee now,” I said. “These affairs are, under God's leave, in some fashion my strength.”

'“Oh, sir,” she says, “are you a physician? We have none.”

'“Then, good people,” said I, “I must e'en justify myself to you by my works.”

'“Look—look ye,” stammers Jack, “I took you all this time for a crazy Roundhead preacher.” He laughs, and she, and then I—all three together in the rain are overtook by an unreasonable gust or clap of laughter, which none the less eased us. We call it in medicine the Hysterical Passion. So I went home with 'em.'

'Why did you not go on to your cousin at Great Wigsell, Nick?' Puck suggested. 'Tis barely seven mile up the road.'

'But the plague was here,' Mr. Culpeper answered, and pointed up the hill. 'What else could I have done?'

'What were the parson's children called?' said Una.

'Elizabeth, Alison, Stephen, and Charles—a babe. I scarce saw them at first, for I separated to live with their father in a cart-lodge. The mother we put—forced—into the house with her babes. She had done enough.

'And now, good people, give me leave to be particular in this case. The plague was worst on the north side of the street, for lack, as



I showed 'em, of sunshine; which, proceeding from the *primum mobile*, or source of life (I speak astrologically), is cleansing and purifying in the highest degree. The plague was hot, too, by the corn-chandlers, where they sell forage to the carters; extreme hot in both Mills along the river, and scatteringly in other places, *except*, mark you, at the smithy. Mark here, that all forges and smith-shops belong to Mars, even as corn and meat and wine-shops acknowledge Venus for their mistress. There was no plague in the smithy at Munday's Lane——'

'Munday's Lane? You mean our village? I thought so when you talked about the two Mills,' cried Dan. 'Where did we put the plague-stone? I'd like to have seen it.'

'Then look at it now,' said Puck, and pointed to the chickens' drinking-trough where they had set their bicycle lamps. It was a rough, oblong stone pan, rather like a small kitchen sink, which Phillips, who never wastes anything, had found in a ditch and had used for his precious hens.

'That?' said Dan and Una, and stared, and stared, and stared.

Mr. Culpeper made impatient noises in his throat and went on.

'I am at these pains to be particular, good people, because I would have you follow, so far as you may, the operations of my mind. That plague which I told you I had handled outside Wallingford in Oxfordshire was of a watery nature, comfortable to the brookish riverine country it bred in, and curable, as I have said, by drenching in water. This plague of ours here, for all that it flourished along watercourses—every soul at both Mills died of it—could not be so handled. Which brought me to a stand. Ahem!'

'And your sick people in the meantime?' Puck demanded.

'We persuaded them on the north side of the street to lie out in Hitheram's field. Where the plague had taken one, or at most two, in a house, folk would not shift for fear of thieves in their absence. They cast away their lives to die among their goods.'

'Human nature,' said Puck. 'I've seen it time and again. How did your sick do in the fields?'

'They died not near so thick as those that kept within doors, and even then they died more out of distraction and melancholy than plague. But I confess, good people, I could not in any sort master the sickness, or come at a glimmer of its nature or governance. To be brief, I was flat bewildered at the brute malignity of the disease, and so—did what I should have done before—dismissed all conjectures and apprehensions that had grown up within me, chose a good hour by my Almanac, clapped my vinegar-cloth to my face, and entered some empty houses, resigned to wait upon the stars for guidance.'

'At night? Were you not horribly frightened?' said Puck.

'I dared to hope that the God who hath made man so nobly curious to search out His mysteries might not destroy a devout seeker. In due time—there is a time, as I have said, for everything under the sun—I spied a whitish rat, very puffed and scabby, which sat beneath the dormer of an attic through which shined our Lady the Moon. Whilst I looked on him—and her—she was moving towards old cold Saturn, her ancient ally—the rat crept languishingly into her light, and there, before my eyes, died. Presently his mate or companion came out, laid him down beside there, and in like fashion died too. Later—an hour or less to midnight—a third rat



did e'en the same; always choosing the moonlight to die in. This threw me into an amaze, since, as we know, the moonlight is favourable, not hurtful, to the creatures of the Moon; and Saturn, being friends with her, as you would say, was hourly strengthening her evil influence. Yet these three rats had been stricken dead in very moonlight. I leaned out of the window to see which of Heaven's host might be on our side, and there beheld I good trusty Mars, very red and heated, bustling about his setting. I straddled the roof to see better.

'Jack Marget came up street going to comfort our sick in Hitheram's field. A tile slipped under my foot.

'Says he heavily enough, "Watchman, what of the night?"

"Heart up, Jack," says I. "Methinks there's one fighting for us that, like a fool, I've forgot all this summer." My meaning was naturally the planet Mars.

"Pray to Him then," says he. "I forgot Him, too, this summer."

'He meant God, whom he always bitterly accused himself of having forgotten up in Oxfordshire, among the King's men. I called down that he had made amends enough for his sin by his work among the sick, but he said he would not believe so till the plague was lifted from 'em. He was at his strength's end—more from melancholy than any just cause. I have seen this before among priests and over-cheerful men. I drenched him then and there with a half cup of waters, which I do not say cure the plague, but are excellent against heaviness of the spirits.'

'What were they?' said Dan.

'White brandy rectified, camphor, cardamoms, ginger, two sorts of pepper, and aniseed.'

'Whew!' said Puck. 'Waters you call 'em!'

'Jack coughed on it valiantly, and went down hill with me. I was for the Lower Mill in the valley, to note the aspect of the Heavens. My mind had already shadowed forth the reason, if not the remedy, for our troubles, but I would not impart it to the vulgar till I was satisfied. That practice may be perfect, judgment ought to be sound, and to make judgment sound is required an exquisite knowledge. Ahem! I left Jack and his lantern among the sick in Hitheram's field. He still maintained the prayers of the so-called Church, which were rightly forbidden by Cromwell.'

'You should have told your cousin at Wigsell,' said Puck, 'and Jack would have been fined for it, and you'd have had half the money. How did you come so to fail in your duty, Nick?'

Mr. Culpeper laughed—his only laugh that evening—and the children jumped at the loud neigh of it.

'We were not fearful of *men's* judgment in those days,' he answered. 'Now mark me closely, good people, for what follows will be to you, though not to me, remarkable. When I reached the empty Mill, old Saturn, low down in the House of the Fishes, threatened the Sun's rising-place. Our Lady the Moon was moving towards the help of him (understand, I speak astrologically). I looked abroad upon the high Heavens, and I prayed the Maker of 'em for guidance. Now Mars sparkingly withdrew himself below the sky. On the instant of his departure, which I noted, a bright star or vapour leaped forth above his head (as though he had heaved up his sword), and broke all about in fire. The cocks crowed midnight through the valley, and I sat me down by the mill-wheel,

chewing spearmint (though that's a herb of Venus), and calling myself all the asses' heads in the world! 'Twas plain enough *now*!"

"What was plain?" said Una.

"The true cause and cure of the plague. Mars, good fellow, had fought for us to the uttermost. Faint though he had been in the Heavens, and this had made me overlook him in my computations, he more than any of the other planets had kept the Heavens—which is to say, had been visible some part of each night wellnigh throughout the year. Therefore his fierce and cleansing influence, warring against the Moon, had stretched out to kill those three rats under my nose, and under the nose of their natural mistress, the Moon. I had known Mars lean half across Heaven to deal our Lady the Moon some shrewd blow from under his shield, but I had never before seen his strength displayed so effectual."

"I don't understand a bit. Do you mean Mars killed the rats because he hated the Moon?" said Una.

"That is as plain as the pikestaff with which Blagge's men pushed me forth," Mr. Culpeper answered. "I'll prove it. Why had the plague not broken out at the blacksmith's shop in Munday's Lane? Because, as I've shown you, forges and smithies belong naturally to Mars, and for his honour's sake, Mars 'ud keep 'em clean from the creatures of the Moon. But was it like, think you, that he'd come down and rat-catch in general for lazy, ungrateful mankind? That were working a willing horse to death. So, then, you can see that the meaning of the blazing star above him when he set was simply this: "Destroy and burn the creatures of the Moon, for they are at the root of your trouble. And thus, having shown you a taste of my power, good people, adieu."'

"Did Mars really say all that?" Una whispered.

"Yes, and twice so much as that to any one who had ears to hear. Briefly, he enlightened me that the plague was spread by the creatures of the Moon. The Moon, our Lady of Ill-aspect, was the offender. My own poor wits showed me that I, Nick Culpeper, had the people in my charge, God's good providence aiding me, and no time to lose neither.

"I posted up the hill, and broke into Hitheram's field amongst 'em all at prayers.

"Eureka, good people!" I cried, and cast down a dead mill-rat which I'd found. "Here's your true enemy, revealed at last by the stars."

"Nay, but I'm praying," says Jack. His face was as white as washed silver.

"There's a time for everything under the Sun," says I. "If you would stay the plague, take and kill your rats."

"Oh, mad, stark mad!" says he, and wrings his hands.

"A fellow lay in the ditch beside him, who bellows that he'd as soon die mad hunting rats as be preached to death on a cold fallow. They laughed round him at this, but Jack Marget falls on his knees, and very presumptuously petitions that he may be appointed to die to save the rest of his people. This was enough to thrust 'em back into their melancholy.

"You are an unfaithful shepherd, Jack," I says. "Take a bat (which we call a stick in Sussex) and kill a rat if you die before sunrise. 'Twill save your people."

"Aye, aye. Take a bat and kill a rat," he says ten times over,



like a child, which moved 'em to ungovernable motions of that hysterical passion before mentioned, so that they laughed all, and at least warmed their chill bloods at that very hour—one o'clock or a little after—when the fires of life burn lowest. Truly there is a time for everything; and the physician must work with it—ahem!—or miss his cure. To be brief with you, I persuaded 'em, sick or sound, to have at the whole generation of rats throughout the village. And there's a reason for all things too, though the wise physician need not blab 'em all. *Imprimis*, or firstly, the mere sport of it, which lasted ten days, drew 'em most markedly out of their melancholy. I'd defy sorrowful Job himself to lament or scratch while he's routing rats from a rick. *Secundo*, or secondly, the vehement act and operation of this chase or war opened their skins to generous transpiration—more vulgarly, sweated 'em handsomely; and this further drew off their black bile—the mother of sickness. Thirdly, when we came to burn the bodies of the rats, I sprinkled sulphur on the faggots, whereby the onlookers were as handsomely suffumigated. This I could not have compassed if I had made it a mere physician's business; they'd have thought it some conjuration. Yet more, we cleansed, limed, and burned out a hundred foul poke-holes, sinks, slews, and corners of unvisited filth in and about the houses in the village, and by good fortune (mark here that Mars was in opposition to Venus!) burned the corn-chandler's shop to the ground. Mars loves not Venus. Will Noakes the saddler dropped his lantern on a truss of straw while he was rat-hunting there.'

'Had ye given Will any of that gentle cordial of yours, Nick, by any chance?' said Puck.

'A glass—or two glasses—not more. But as I would say, in fine, when we had killed the rats, I took ash, slag, and charcoal from the smithy, and burnt earth from the brickyard (I reason that a brickyard belongs to Mars), and rammed it with iron crowbars into the rat-runs and buries, and beneath all the house floors. The Creatures of the Moon hate all that Mars hath used for his own clean ends. For example—rats bite not iron.'

'And how did poor stuttering Jack endure it?' said Puck.

'He sweated out his melancholy through his skin, and caught a loose cough, which I cured with electuaries, according to art. It is noteworthy, were I speaking among my equals, that the venom of the plague translated, or turned itself into, and evaporated, or went away as, a very heavy hoarseness and thickness of the head, throat, and chest. (Observe from my books which planets govern these portions of man's body, and your darkness, good people, shall be illuminated—ahem!) None the less, the plague, *qua* plague, ceased and took off (for we only lost three more, and two of 'em had it already on 'em) from the morning of the day that Mars enlightened me by the Lower Mill.' He coughed—almost trumpeted—triumphantly.

'It is proved,' he jerked out. 'I say I have proved my contention, which is, that by Divine Astrology and humble search into the veritable causes of things—at the proper time—the sons of wisdom may combat even the plague.'

'H'm!' Puck replied. 'For my own part I hold that a simple soul—'

'Mine?—simple, forsooth?' said Mr. Culpeper.



'A very simple soul, a high courage tempered with sound and stubborn conceit, is stronger than all the stars in their courses. So I confess truly that you saved the village, Nick.'

'I stubborn? I stiff-necked? I ascribed all my poor success, under God's good providence, to Divine Astrology. Not to me the glory! You talk as that dear weeping ass Jack Marget preached before I went back to my work in Red Lion House, Spitalfields.'

'Oh! Stammering Jack preached, did he? They say he loses his stammer in the pulpit.'

'And his wits with it. He delivered a most idolatrous discourse when the plague was stayed. He took for his text: "The wise man that delivered the city." I could have given him a better such as: "There is a time for——"

'But what made you go to church to hear him?' Puck interrupted. 'Wail Attersole was your lawfully appointed preacher, and a dull dog he was!'

Mr. Culpeper wriggled uneasily.

'The vulgar,' said he, 'the old crones and—ahem—the children, Alison and the others, they dragged me to the House of Rimmon by the hand. I was in two minds to inform on Jack for maintaining the mummeries of the falsely called Church, which, I'll prove to you, are founded merely on ancient fables——'

'Stick to your herbs and planets,' said Puck laughing. 'You should have told the magistrates, Nick, and had Jack fined. Again, why did you neglect your plain duty?'

'Because—because I was kneeling, and praying, and weeping with the rest of 'em at the altar rails. In medicine this is called the Hysterical Passion. It may be—it may be.'

'That's as may be,' said Puck. They heard him turn the hay. 'Why, your hay is half hedge-brishings,' he said. 'You don't expect a horse to thrive on oak and ash and thorn leaves, do you?'

\* \* \* \* \*

*Ping-ping-ping* went the bicycle bell round the corner. Nurse was coming back from the Mill.

'Is it all right?' Una called.

'All quite right,' Nurse called back. 'They're to be christened next Sunday.'

'What? What?' They both leaned forward across the half-door. It could not have been properly fastened, for it opened, and tilted them out with hay and leaves sticking all over them.

'Come on! We must get those two twins' names,' said Una, and they charged up-hill shouting over the hedge, till Nurse slowed up and told them.

When they returned, old Middenboro had got out of his stall, and they spent a lively ten minutes chasing him in again by starlight.

# MEDICAL AND SURGICAL PROGRESS.

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## PROGRESS IN TUBERCULOSIS.

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### A REVIEW OF RECENT LITERATURE.

By JOHN B. HAWES, 2ND, M. D., of Boston.

1. Giffin and Sheldon (*Journal-Lancet*, Vol. XXV, No. 9, p. 223, May 1, 1915).
2. Riviere (*Lancet*, Vol. II, No. 4799, August 21, 1915).
3. Landis and Lewis (*Amer. Jour. Med. Sc.*, August, 1915).
4. Davis (*Transactions National Tuberculosis Association*, p. 255, 1915).
5. Hawes (*Boston Med. and Surg. Jour.*, October 28, 1915).
6. Peers (*California State Jour. Med.*, August, 1915).
7. Ford (*Medical Record*, September 18, 1915).
8. Klotz (*Boston Med. and Surg. Jour.*, December 9, 1915).
9. Litzner (*Muench. med. Wochenschr.*, August 10, 1915).
10. Crofton (*Brit. Med. Jour.*, No. 2832, p. 625, April 10, 1915).
11. Peters (*Medical Record*, January 2, 1915).
12. Hawes (*Amer. Jour. Med. Sc.*, April 19, 1915).
13. Stoll (*Amer. Jour. Dis. of Children*, September, 1915).
14. Park (*Arch. Pediat.*, Vol. XXXII, No. 7, p. 481, July, 1915).
15. Howell (*Amer. Jour. Dis. of Children*, August, 1915).
16. Stoll (*Amer. Jour. Dis. of Children*, September, 1915).
17. Garvin (*Albany Medical Annals*, August, 1915).
18. Woodruff (*Arch. Pediat.*, July, 1915).
19. Gage (*Boston Med. and Surg. Jour.*, August 26, 1915).
20. Risley (*Boston Med. and Surg. Jour.*, February 18, 1915).
21. Hawes (*Interstate Med. Jour.*, Vol. XXI, No. 9, 1914).
22. Burnham (*Jour. Amer. Med. Assoc.*, July 10, 1915).
23. Jacot (*Rev. Med. de la Suisse romande*, Vol. XXXV, No. 3, p. 117, March, 1915).
24. Lapham (*Southern Med. Jour.*, February 19, 1915).
25. Woodcock (*Edinburgh Med. Jour.*, November, 1915).
26. Bullock and Twichell (*Amer. Jour. Med. Sc.*, June, 1915).
27. Sloan and Hamman (*Bulletin Johns Hopkins Hospital*, Vol. XXVI, No. 294, August, 1915).
28. Gilbert and Gregg: American Archives of Immunologists, 2nd Annual Report, Washington, D. C.
29. Austrian and Hamman (*Bulletin Johns Hopkins Hospital*, August, 1915).
30. Baldwin (*Amer. Jour. Med. Sc.*, June, 1915).
31. Way (*Charlotte Med. Jour.*, April, 1915).
32. Stone (*Boston Med. and Surg. Jour.*, July 29, 1915).
33. Hawes (*Boston Med. and Surg. Jour.*, May 27, 1915).
34. White (*Transactions National Tuberculosis Association*, p. 269, 1915).

35. Sachs (*Transactions National Tuberculosis Association*, p. 278, 1915).
36. Twichell (*New Mexico Med. Jour.*, January, 1915).
37. Rubow and Wurtzen (*Hospitalstid.*, July 28, 1915).
38. Schaffer (*Zeitschr. fuer Tuberkulose*, Vol. XXIV, No. 2, p. 81, June, 1915).
39. Pettit (*Illinois Med. Jour.*, July, 1915).

Progress in tuberculosis during the past year has consisted in giving emphasis to physicians and to the laity to already well-known facts and methods, rather than in demonstrating anything new.

*Diagnosis.*—The position of the *x-ray* as an aid in diagnosis seems to be gradually reaching a sane and sensible point. Roentgenologists apparently are coming to realize that the part which the *x-ray* plays in diagnosis, although a valuable one, is not the only part; that the *x-ray* simply gives a certain amount of additional information, and that it can never take the place of older and well-tried methods of diagnosis. Giffin and Sheldon, although still claiming too much for the *x-ray* methods of diagnosis, wisely call attention to the fact that it is the man who interprets the *x-ray* plate rather than the *x-ray* plate itself which makes the diagnosis.

Riviere discusses a new sign and its value in diagnosis which consists of characteristic bands of percussion impairment of constant position, shape, and size. These can be found by skilful percussion before any other signs of phthisis and in certain cases before symptoms develop. They do not depend upon structural changes, but are of reflex origin. Riviere belongs to that English school which puts far greater value on percussion than on any other method of physical examination. His observations need to be confirmed before much value can be attached to them.

In differential diagnosis, Landis and Lewis discuss the subject of latent syphilitic infection in the lungs. A syphilitic infection may be an important factor in certain atypical lung cases. It should be borne in mind, however, that because a patient improves under anti-luetic treatment does not necessarily prove that the process in the lungs is due to syphilis. This is an excellent review of this most important and difficult subject.

Davis, in an interesting article on streptothrix infections, believes that pulmonary processes due to this cause, are more common than is generally supposed, and that such processes cannot always be differentiated clinically from tuberculosis. The organisms are acid and alcohol fast, but not as acid proof as the tubercle bacillus. They are relatively non-resistant to antiformin. Only certain strains are pathogenic to man and beast.

Hawes, discussing errors in diagnosis of chronic lung diseases, in addition to syphilis, calls attention to new growths, influenza processes and chronic pneumonitis as possible sources of error, and urges that these cases be carefully studied and not at once stamped as tuberculosis.

Peers emphasizes the frequency of tuberculosis as the cause of symptoms of all kinds. He urges that in every obscure medical case, the physician should at least consider tuberculosis as a possibility, and that one or two negative sputum examinations should



not entirely rule it out. On the other hand, he states that a positive tuberculin test does not necessarily mean that the patient needs treatment. This is a wise remark.

Ford discusses the lack of early diagnosis and makes the statement, which is unfortunately only too true, that the average general practitioner does not know how to diagnose pulmonary tuberculosis. He blames the medical schools for this, in that this subject is not given sufficient attention.

Klotz discusses the value of the so-called 'Krœnig's isthmus' and its value in diagnosis. He concludes that unless the disparity of the apical percussion field, as expressed in terms of Krœnig's isthmus, is very marked, it does not necessarily point toward tuberculosis on the corresponding side, that such disparity is of much less significance on the right side than it is on the left, and that in most instances the disparity of the apical percussions fields is simply due to anatomical changes not relative to tuberculosis. It is high time that these conclusions should be reached. Much time is wasted by physicians and medical students in endeavoring to find one or two centimeters' difference between the bands of resonance at each apex, and much harm is done by deducing certain things from such differences.

*Treatment.*—Tuberculin is coming to be used more in non-pulmonary forms of tuberculosis and somewhat less in the pulmonary forms. Litzner, discussing focal reaction in a tuberculin test, warns against the use of tuberculin in ambulatory treatment where there is marked focal without a general reaction. Crofton urges prophylactic inoculation against tuberculosis in families where there has been marked exposure to the disease. He believes that a short course in tuberculin is of great value in preventing later development of tuberculous disease. Peters, discussing the value of tuberculin, states as follows: "As yet we have no specific for tuberculosis, and tuberculin nor any other factor in the treatment of this disease will raise the dead consumptive. Yet I feel that conscientious and careful use makes tuberculin an agent for great good." If he added to this statement that conscientious and careful use in a sanatorium, where the patient is under absolute supervision, his conclusion would be of still greater value.

Hawes takes up the subject of tuberculosis in elderly persons as to diagnosis and treatment. He is unable to confirm Stoll's statement that a positive d'Espine sign in elderly persons means tuberculosis rather than a chronic bronchitis. He calls attention to the fact that elderly persons rarely react well to the strict régime of sanatorium life. In Massachusetts state sanatoria it is only in exceptional cases that patients over sixty-five years are admitted.

*Tuberculosis in Childhood.*—Park, of the New York Health Department, discusses the transmission of tuberculosis in childhood, particularly with reference to tuberculous milk in New York City. Howell has made a careful study of the signs and symptoms of enlargement of the bronchial glands. He emphasizes the fact that such enlarged glands are not necessarily tuberculous. This is an important point and it should be constantly borne in mind. Stoll discusses the value of the d'Espine sign. He again emphasizes the fact that the presence of this sign means enlarged bronchial glands, but that these glands are not necessarily tuberculous. Its presence in a delicate child is suggestive of tuberculosis, but not necessarily

conclusive. In elderly persons a positive d'Espine sign speaks for tuberculosis rather than for a chronic bronchitis. This latter statement has not been confirmed, nor would it seem to rest upon any sound pathological basis. Garvin discusses tuberculous infection in childhood. Whether or not the individual will develop pulmonary disease in later life depends upon the quality and quantity of his first infection in early life.

The fundamental thought in prophylaxis must be directed to the child and to his family and home surroundings. The next important point of any tuberculosis campaign should be directed against those factors which will cause a later reinfection with the germs already present. Woodruff, discussing the tuberculous child, emphasizes the value of rest and exercise in proper proportions and the need of prolonged treatment after the child has left the sanatorium or has ceased to be under absolute supervision.

*Non-Pulmonary Tuberculosis.*—Gage presents a careful study of acute tuberculous inflammation of the ileocolic glands simulating acute appendicitis. Risley considers the same subject. Acute inflammation or enlargement of the tuberculous mesenteric or retroperitoneal glands often simulates acute appendicitis. It may be, and usually is, impossible to make a correct pre-operative diagnosis in these cases. Most of these cases show symptoms of an acute appendicitis or of chronic intestinal obstruction. Hawes has reviewed the cases at the Massachusetts General Hospital and made a careful study of the signs and symptoms of this condition.

Burnham believes that tuberculin, especially sensitized B. E., is of great value in various forms of surgical tuberculosis and should be used in dispensaries and elsewhere where a sanatorium régime is not possible. It is evident that this is coming to be the opinion held everywhere in this country. It is important, however, to remember that tuberculin alone is not the chief factor, but that tuberculin, good hygienic treatment, and wise and conservative surgery each must play its part in the treatment of non-pulmonary tuberculous disease. The profession, and especially the surgeons, are coming at last to realize that tuberculosis, whether in the lungs or elsewhere, is always the same, and that the treatment should be directed to the patient who has the disease rather than to the disease itself.

*Artificial Pneumothorax.*—One notes with pleasure and relief that artificial pneumothorax is at last finding its proper position in the treatment of pulmonary tuberculosis. It has been through the stage when it was hailed as a cure for all forms of phthisis. While there are still a few hyperenthusiasts yet maintaining this position, the great majority of the profession realizes that it plays only a comparatively small part in treatment, and that it should be used only when the patient can be under absolute supervision over a long period of time.

Jacot describes a number of cases of purulent pleurisy complicating artificial pneumothorax. Lapham finds that 20 per cent. of the cases of pneumothorax which she discusses developed pleurisy subsequent to this procedure.

Woodcock discusses the dangers of artificial pneumothorax and comes to wise and sane conclusions. Bullock and Twichell, in an excellent article on the exudates in pneumothorax, urge that this treatment be employed in carefully selected cases only and where sanatorium and climatic treatment can likewise be employed.



Sloan and Hamman report their results of the use of artificial pneumothorax during the past four years. The induced pneumothorax treatment applied to 40 patients with moderately advanced tuberculosis and 4 with advanced pulmonary disease, and 1 with bronchiectasis, influenced the progressing course of the disease little or not at all in 60 per cent. It did cause temporary improvement in a number of these cases, and to a small number has brought about perfect health and complete working capacity for two and one-half years.

*Pathological and Bacteriological.*—Gilbert and Gregg discuss the virulence of various strains of human tubercle bacilli. The use of living bacilli for the production of immunity has been of little avail because of our inability to control the exact number and the virulence of the bacilli. Their work goes to show the great variation in the lethal dose of different virulent cultures.

Austrian and Hamman in their investigations of tubercle bacilli in circulating blood were unable to demonstrate the presence of tubercle bacilli in the blood in a single instance, notwithstanding the fact that many of the patients when examined were in the last stages of the disease. This statement coming from such a source is worthy of most serious consideration.

Baldwin, discussing immunity in tuberculosis, believes that the ultimate survival of those who acquire a relative immunity against the disease will tend to diminish the severity, but that many generations may be required to accomplish this. The opportunities for infection now universal in cities will diminish gradually in civilized lands by lessening the danger from advanced cases as well as from bovine sources. For many years, however, "the number of carriers will increase owing to the improved care, longer life, and higher standards of living among the people." As time goes on, the amount and frequency of severe infections, however, will diminish while the number of those with slight harmless infections should relatively increase.

*Sociological.*—Way calls attention to the importance of tuberculosis carriers and to the need of careful examination of all members of every family in which there is a known case of pulmonary tuberculosis. The trained tuberculous subject, however, who knows how to dispose of his sputum properly and has a sufficiently aroused private and personal as well as an educated public health conscience to compel his taking proper precautions, should be free to come and go as he wills without let or hindrance, as his danger to others lies where he can almost wholly control it. This is a sane remark.

Undoubtedly, as a result of the educational campaign which has been waged so constantly for the past ten years, there is developing a recrudescence of phthisisphobia, which does injustice in certain instances.

Stone, in a good article, describes the policy of the state of Massachusetts in regard to the tuberculosis problem. Massachusetts is still, like other states, devoting its attention to segregation of consumptives and protection of the public; its real sanatorium work is unfortunately more in fact than in name. With the establishment of local tuberculosis dispensaries in every city or town of 10,000 inhabitants or over; and with the steady increase of local tuberculosis hospitals, he believes that the time is not far distant when the state sanatoria can devote themselves to the treatment of incipient and early cases.



Hawes urges that the medical profession and local authorities devote more time and assume more responsibility toward the discharged sanatorium patient. Many relapses would be prevented were this done.

White states as his belief that "any given unit of population occupying any given territory, no matter how small the unit, that can demonstrate the accomplished control of this disease, will solve the problem for the whole nation." He presents a working plan whereby for each 100,000 of population there should be a hospital of 200 beds, a dispensary, an open-air school, fifteen nurses of whom five are visiting social service nurses, and four or five physicians.

Sachs, discussing the official responsibility of the city in the tuberculosis problem, has many good suggestions to make. Efficiency in this work calls for 'united effort with centralization of authority.'

*Heliotherapy.*—The development of heliotherapy, or sunlight treatment, so that it can be carried out in private form outside of sanatoria and in climates and localities which were formerly considered unsuited for its use, marks one of the greatest steps in the progress of this year.

Twichell, in a most interesting article, describes the effects of the sun's rays on experimental tuberculosis in guinea-pigs and rabbits. In some cases the tubercle bacilli were actually killed, and in others they were restrained in their growth by direct exposure to the sun's rays.

Rubow and Wurtzen report favorable results with the use of phototherapy in pulmonary disease. Instead of direct sunlight, they use the Finsen rays, exposing the body gradually as is done in cases where the sun's rays alone are used. They urge that this method be given further trial.

Schaffer describes heliotherapy as used in Denmark. He states that as long ago as 1902, sun baths were introduced as part of the routine treatment of lung and bone tuberculosis. The duration of these baths is only five or ten minutes at first, gradually increasing up to an hour. This method was never used on the patients with a tendency to hemoptysis or in progressing pulmonary lesions. He reports favorable results.

*Miscellaneous.*—Pettit discusses traumatism as an etiological factor in pulmonary tuberculosis. This is an excellent article with numerous references. Trauma is never a primary cause of tuberculosis. If we believe it to be a secondary cause, the other factors which commonly contribute to the development of tuberculosis must be excluded. "For medico-legal cases the complexities of the situation are so great as to make it almost, if not quite, impossible to determine how far trauma is ever a contributory factor in the development of tuberculosis."

This statement, although undoubtedly true, is not, however, the opinion generally held by the courts. The court is not dealing with things which may be the *possible* cause of the development of tuberculosis, but with factors which may be a *probable* cause of its development. In Massachusetts, at least, this has certainly been the ground held by the Industrial Accident Board in awarding damages to plaintiffs who develop tuberculosis subsequent to an injury. Each case, of course, must be decided on its own merits, and the development of the tuberculosis must bear a definite relation in time and in other ways to the alleged injury.

## BOOK REVIEWS.

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PELLAGRA. By E. M. Perdue, A. M., M. D., D. P. H., Prof. of Preventive and Tropical Medicine, Eclectic Medical University, etc. etc. Kansas City, Mo.: Burton Publishing Co. 1916. Price, \$3.00.

The author of this book makes a special plea for recognition of the work of the two Italians, Alessandrini and Scala, on pellagra. He gives a translation of some of their more important publications, and adds some experiments of his own which are in large part repetitions of their experiments.

The theory of Alessandrini and Scala to account for the etiology of pellagra is that the disease arises as a result of constant drinking of water either originating in or flowing through argillaceous terrain—or in other words, a clayey soil. It is chiefly the silica in colloid solution which is held responsible for the disease.

Experiments were carried out on dogs, monkeys, rabbits and guinea-pigs, and dermatological, intestinal and neurological symptoms were obtained by administration either of water from pellagrous districts or water containing colloidal silica. The two Italians further believe that during the disease there is a forced retention of mineral salts succeeded by an excessive liberation of acids, and that these phenomena are due to the ingestion of the silica. They advise, as a mode of treatment, injections of trisodic citrate, and their case reports certainly suggest a distinct improvement as a result of this treatment, shown especially when the motor powers of the patient were tested with a dynamometer.

Perdue adds a survey of the occurrence of pellagra in the United States, and believes that he can demonstrate a relationship between the occurrence of the disease and the geological structures noted in the various pellagrous districts of this country.

Since the book is very frankly a plea for a special point of view of a disease that is still not clearly defined as regards etiology, it would not be fair either to damn or to commend. The book is suggestive and interesting.

DISEASES OF THE EYE. A Handbook of Ophthalmic Practice for Students and Practitioners. By George E. DeSchweinitz, M. D., L.L. D. (Univ. of Pa.), Professor of Ophthalmology in the University of Pennsylvania, etc. etc. Eighth Edition, Reset with 386 Illustrations and 7 Colored Plates. Philadelphia and London: W. B. Saunders Company. 1916. Price, \$6.00.

A new edition of DeSchweinitz's deservedly popular textbook cannot fail to be welcomed by students and practitioners of ophthalmology.

When the first edition appeared in 1892, it was clear that the treatise represented no mere rehash of other men's work. In these pages were evidences of the wide personal experiences and original observations of the author, the material systematically grouped to insure proper emphasis on essentials.

Dr. DeSchweinitz is the fortunate possessor of a style dis-

tingnished for elegance and clarity, so that his writings possess to a degree unusual among medical writers, a literary flavor.

In this eighth edition the chapters have been revised thoroughly in an endeavor to include reference to the important ophthalmic observations and therapeutic measures which have been made and recommended during the last three years.

**THE PATHOLOGY OF TUMOURS.** By E. H. Kettle, M. D., B. S., Lond., Assistant Pathologist, St. Mary's Hospital, Assistant Lecturer on Pathology, St. Mary's Hospital Medical School, etc. etc. With One Hundred and Twenty-six Illustrations. New York: Paul B. Hoeber. 1916. Price, \$3.00.

This volume fulfils a need in so far as it furnishes the student with an adequate description of tumor pathology, in comfortably small compass. More than this, the student is not confused by a complex classification, but is rather logically inducted through the old and, on the whole, satisfactory classification and nomenclature.

The book is divided into three parts,—Part I, devoted to the general biology of tumors; Part II, to the general pathology of tumors; and Part III, to the special pathology of tumors. In this third part, the special systems and organs of the body are considered.

Very naturally, a small monograph, such as is this one, cannot be expected to contain any new data. Nor must one look in it either for the detailed discussion of complicated pathological questions or the definitive settlement of most points. As a foundation, on which to build later a firm superstructure of intimate knowledge of tumor pathology, the book serves a good purpose.

**VENESECTION—A Brief Summary of the Practical Value of Venesection in Disease.** For Students and Practitioners of Medicine. By Walton Forest Dutton, M. D., Fellow American Medical Association; Member Medical Society of the State of Pennsylvania; Allegheny County Medical Society; Ex-President Carnegie Academy of Medicine, etc. etc. Illustrated with Several Text Engravings and Three Full-page Plates, One in Colors. Philadelphia: F. A. Davis Co.

This book, in common with the recently published monograph on Venesection by Heinrich Stern, smacks a little too much of the special pleader. In spite of his protests to the contrary, Dr. Dutton creates the impression in the mind of the reader, that venesection is somewhat of a panacea.

The book is particularly attractive in its make-up, well illustrated, indeed somewhat needlessly over-illustrated, and fairly peppered with historic allusions. The technique of venesection is described in detail, and the indications for this therapeutic procedure are furnished at length. The result indicates that Dr. Dutton certainly has done his share in an attempt to reestablish a subject that truly stands in need of rehabilitation.

**ALCOHOL: ITS INFLUENCE ON MIND AND BODY.** By Edwin F. Bowers, M. D. New York: Edward J. Clode. 1916. Price, \$1.25.

This is a book written in a popular way on the subject of alcohol. It is not a scientific exposition of our present knowledge in regard to alcohol and its effects on the human body. It is written by an



individual who wishes to emphasize his own personal horror of the influence of alcohol upon the human race. In order to strengthen his appeal he uses whatever scientific facts he can lay his hand on in support of his view, and ignores all facts which would seem to weaken it. In addition to this he is not careful about the use of adjectives, and does not object to the use of exaggerated words, slang expressions, and other methods which are common to the advocate of a particular prejudice.

This book has no scientific or medical value, but may be of interest to those who have a sense of humor and some curiosity in regard to the intemperate use of words in attacking the alcohol habit.

**NERVE INJURIES AND SHOCK.** By Wilfred Harris, M. D., (Cantab.), F. R. C. P. (Lond.), Physician to St. Mary's Hospital, London, etc. etc. New York: Oxford University Press. 1915. Price, \$1.25.

This is one of the series of small primers published under the Oxford War Primers, and deals with nerve injuries and shocks. It is designed to give as briefly as possible the important features of the various forms of nerve injuries together with appropriate treatment, in the hope that it may be of interest to others interested in nervous disease.

It cannot be said that this little volume is of particular value. It is rather to be considered as a résumé of the knowledge on the subject which is already known and which can be readily obtained in any of the larger textbooks.

The book, however, is well arranged and the subject-matter is clearly treated.

**CEREBRO-SPINAL FEVER.** By Thomas J. Horder, M. D., Assistant Physician, St. Bartholomew's Hospital, etc. etc. With Seventeen Illustrations. New York: Oxford University Press. 1915. Price, \$1.25.

This is a manual of 175 pages on cerebro-spinal fever, and is written with the primary purpose of use in actual practice. It contains all the important data on the subject of the disease it treats, with descriptions of methods of diagnosis and treatment. The purpose of this book, as plainly stated by the author in the preface, is to be of service to the general practice, and it does not touch upon any of the intricate points of the subject and does not go into the question of pathology more than is necessary for the brief consideration of the subject.

For a brief description of the disease in question, and with due regard to its limitations, the book may be said to be of some value.

**LES FIEVRES PARATYPHOIDES.** Par Jacques Carles, Professeur Agrégé à la Faculté de Médecine de Bordeaux, Médecin des Hôpitaux de Bordeaux. Avec 15 figures. Paris: Librairie J. B. Baillière et Fils. 1916. Price 1 fr. 50.

The paratyphoid fevers, once considered a variety, are now recognized as occurring nearly as frequently as typhoid itself. Their great multiformity and the numerous points in which they differ from typhoid fever make a special consideration of this group of infections very necessary. Prof. Carles has had exceptional opportunities of studying the paratyphoid fevers, on account of the enormous material during the present war. His presentation of the subject is therefore authoritative.

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## EDITORIAL.

### REPUTATION.\*

By a peculiar weakness of human nature, people generally think too much about the opinion which others form of them; although the slightest reflection will show that this opinion, whatever it may be, is not in itself essential to happiness. Therefore it is hard to understand why everybody feels so very pleased when he sees that other people have a good opinion of him, or say anything flattering to his vanity. If you stroke a cat, it will purr; and, as inevitably, if you praise a man, a sweet expression of delight will appear on his face; and even though the praise is a palpable lie, it will be welcome, if the matter is one on which he prides himself. If only other people will applaud him, a man may console himself for downright misfortune, or for the pittance he gets from the two sources of human happiness already discussed; and conversely it is astonishing how infallibly a man will be annoyed, and in some cases deeply pained by any wrong done to his feeling of self-importance, whatever be the nature, degree, or circumstances of the injury, or by any depreciation, slight, or disregard.

If the feeling of honor rests upon this peculiarity of human nature, it may have a very salutary effect upon the welfare of a great many people, as a substitute for morality; but upon their happiness, more especially upon that peace of mind and independence which are so essential to happiness, its effect will be disturbing and prejudicial rather than salutary. Therefore it is advisable, from our point of view, to set limits to this weakness, and duly to consider and rightly to estimate the relative value of advantages, and thus temper, as far as possible, this great susceptibility to other people's opinion, whether the opinion be one flattering to our vanity, or whether it causes us pain; for in either case it is the same feeling which is touched. Otherwise, a man is the slave of what other

\*From "The Wisdom of Life." By Arthur Schopenhauer. Washington and London: M. Walter Dunne.

people are pleased to think,—and how little it requires to discontent or soothe the mind that is greedy of praise:—

Sic leve, sic parvum est, animum quod laudis avarum  
Subruit ac reficit.

Therefore it will very much conduce to our happiness if we duly compare the value of what a man is in and for himself with what he is in the eyes of others. Under the former comes everything that fills up the span of our existence and makes it what it is, in short, all the advantages already considered and summed up under the heads of personality and property; and the sphere in which all this takes place is the man's own consciousness. On the other hand, the sphere of what we are for other people is their consciousness, not ours; it is the kind of figure we make in their eyes, together with the thoughts which this arouses.\* But this is something which has no direct and immediate existence for us, but can affect us only mediately and indirectly, so far, that is, as other people's behavior toward us is directed by it; and even then it ought to affect us only in so far as it can move us to modify *what we are in and for ourselves*. Apart from this, what goes on in other people's consciousness is, as such, a matter of indifference to us: and in time we get really indifferent to it, when we come to see how superficial and futile are most people's thoughts, how narrow their ideas, how mean their sentiments, how perverse their opinions, and how much of error there is in most of them; when we learn by experience with what depreciation a man will speak of his fellow, when he is not obliged to fear him, or thinks that what he says will not come to his ears. And if ever we have had an opportunity of seeing how the greatest of men will meet with nothing but slight from half-a-dozen blockheads, we shall understand that to lay great value upon what other people say is to pay them too much honor.

At all events, a man is in a very bad way, who finds no source of happiness in the first two classes of blessings already treated of, but has to seek it in the third, in other words, not in what he is in himself, but in what he is in the opinion of others. For, after all, the foundation of our whole nature, and, therefore, of our happiness, is our physique, and the most essential factor in happiness is health, and next in importance after health, the ability to maintain ourselves in independence and freedom from care.

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\*Let me remark that people in the highest positions in life, with all their brilliance, pomp, display, magnificence and general show, may well say: our happiness lies entirely outside us, for it exists only in the heads of others.



# ORIGINAL ARTICLES.

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## PRENATAL AND POSTNATAL CARE.

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### THE PREGNANCY CLINIC.

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By FOSTER S. KELLOGG, M. D., of Boston.

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In recent years, scientific prenatal care has received much attention in this country. Pamphlets on the subject prepared by obstetricians of authority and distributed under government charitable society, and individual auspices, easily available to physicians and prospective mothers, are slowly replacing the handed-down bunkum, mixed with warnings and exaggerated personal, or hearsay experience which was formerly prenatal care. There is a fairly large intelligent demand for this 'literature,' and it is growing, though it goes without saying, that by far the majority of obstetrics occurs,—and comes to grief naturally, *i. e.*, without benefit of prenatal care. The cause is, of course, that the majority of physicians and patients still prefer to consider all pregnancy and labor natural, at least until something is obviously wrong. This is a fair enough proposition except that without prenatal care matters may be very wrong, but this fact passes unnoticed.

With so much excellent literature available on prenatal care, it is futile to waste time in this paper with more than a very brief outline of what the author considers adequate prenatal care. The purposes of this paper are chiefly two: First, to see what prenatal care applied to a large number of patients in a pregnancy clinic accomplishes; in other words, to see if we can justify the bother and expense of prenatal care by its results in fact as well as in theory; and second, to discuss at some length postnatal care, a subject the author considers in all its aspects nearly as important as prenatal care and which he makes bold to say is neglected not only by those physicians who do not practise prenatal care for their patients, but also by those who do, not only in private practice but in the very clinics established for the sole purpose of seeing that a mother and her baby come to the best possible end. It surely is no difficult proposition to grasp that all postnatal care, except in one-child sterility, is in its widest and most sensible sense prenatal care for the next baby. If we carefully guard a primipara

through a pregnancy, taking time, as we do in a clinic, to follow her up with a nurse to see that she reports at stated intervals, then give her first-rate hospital or home care in labor, and then at the end of ten, fourteen, or twenty-one days turn her loose and forget her, which is practically what on the whole the prenatal clinic does, do we not fall short on prenatal care? The possible pitfalls of the new mother for the first year are many, and if we will not trust a prenatal case to report trouble herself on her own initiative, or to depend on the advice of relatives and friends for guidance, why should we on a postnatal case? Yet that is just what we do when we salve our consciences on discharge by telling a patient that if anything goes wrong, she *may* report back to the clinic.

Briefly, what is adequate prenatal care? The answer to this question is somewhat different, depending on whether we are dealing with private practice or hospital work. In private practice, adequate prenatal care is quite simple. My criticism of most prenatal literature is that the authors, setting out to do something important, as it is, feel they must make it big; the larger the prenatal pamphlet given a patient, the more likely it is that one of two objectionable things will happen. One sort of woman will read it over and say it is too much to remember, and toss it aside forever; the other will spend too much time on it and so risk the danger of getting her mind set on the subject of her pregnancy to the exclusion of everything else, and is therefore likely to become morbid. A simple set of rules, not over ten, is enough to guide the usual patient through her pregnancy safely. I submit such a set below as used in my own practice:—

1. Exercise moderately twice a day,—walking to a point just short of tiredness. Sit out as much as possible.

2. Daily bath of warm water followed by cool—not hot or cold—followed by brisk rub, except abdomen.

3. Specimen of urine for analysis every month until the seventh, every two weeks thereafter.

4. Diet: Meat, fish *or* eggs only once a day. Eight glasses of water a day anyway, ten is better, much fruit and green vegetables, moderate amounts of potato, bread, butter and cereals. Do not eat excessively. If three normal meals cause distress, eat less at a time and oftener.

5. Report to physician if

1. Bowels do not move every day.

2. Headache.

3. Swelling of hands, face, feet, or ankles.

4. Flowing in any degree. (Go to bed and await physician's arrival.)

5. Nausea or vomiting after the third month, before if excessive.

6. Blurring of vision.

7. Persistent backache or abdominal pain.

6. Report in person or call up for appointment *one* month before expected date of confinement.

7. Do not (1) get tired, (2) swim, (3) dance, (4) play tennis or golf, (5) ride fast or over one-half hour at a time in automobile.

8. Do not massage or make applications to breasts or nipples.
9. Avoid obstetrical conversations with friends or relatives.
10. If worried or in doubt telephone physician immediately.

A definite set of rules is preferable to a physiological discussion of the subject. The patient wishes a good baby as easily as possible, with her own health conserved, and she expects her attendant to see that she gets it. She does not wish to learn how it is done. She may think she does for a bit, but she really does not.

In the pregnancy clinic, prenatal care includes whatever of the above rules are applicable to a woman in poorer circumstances, together with some social service to see that the expectant mother receives food; frequent observation and a greater dependence on objective symptoms because this class of patients is, on the whole, less apt to pay attention to subjective ones. A follow-up nurse who is in the confidence of the patient, and who therefore gets facts of importance which some women, especially among the more ignorant, are unlikely to tell the clinic physician, who changes frequently and so, in certain instances, is unable to obtain the confidence of the patient which he would in private practice. Slight bleeding in an ignorant primipara is the common example of what I mean.

Prenatal care in both private and clinic practice includes a careful history, special care being taken for a history suggesting probable cardiac disease or phthisis, to previous pregnancies, a careful general physical examination, including duration of pregnancy, pelvic measurements, and in my opinion, an immediate vaginal examination, unless pregnancy has progressed to a point where the enlarged fundus can be felt above the symphysis. This, because a certain number of pregnant retroversions will thus be diagnosed early and the mal-position corrected before trouble results. If the fundus is distinctly felt above the symphysis, I see no point in vaginal examination until the patient reaches, or is somewhat past, the eighth month, when the size of the baby in relation to its mother's pelvis can be estimated, unless some special indication, as bleeding or profuse discharge, call for it. The next step in general prenatal care is to set definite intervals at which the patient shall report with a specimen of urine, preferably a specimen of the mixed twenty-four hour amount, which has been measured. This interval should be about every month until the seventh, and every two weeks thereafter. At this time, the blood-pressure should be taken and recorded, together with the urinary findings; the question of elimination, of bleeding, of any or all symptoms of toxemia,—namely, swelling of the feet, hands, or face, frontal headache, blurring of vision, epigastric pain, nausea and vomiting, dyspnea and rapid pulse; water and food intake, of sleep, exercise, worry, etc., investigated; and toward the end of pregnancy, the vaginal exam-



ination, with or without an anesthetic, to determine the probable ability of the mother's pelvis to take successfully the passage of her baby's head. These things being right, the patient may be reassured that everything is going normally.

This, then, is in brief what constitutes adequate prenatal care in normal cases. As briefly then, what should be theoretically obtained from it: (1) The best general condition that the given individual may have in pregnancy; (2) the early discovery of malposition of the uterus; (3) the early discovery of incipient excessive vomiting, and its correction in many instances before it reaches a severe stage; (4) the early discovery of incipient phthisis which calls for immediate therapeutic abortion, and which with early abortion usually does as well as though pregnancy had not occurred; (5) the early discovery of cardiac disease, enabling one to decide at the most favorable time for or against therapeutic abortion; and if the decision to continue the pregnancy is made to lay out and check up that course of life which will best conserve the muscle power of the heart. In passing, it should be said that cardiac cases in pregnancy should be seen oftener than the above schedule, because it is of the utmost importance to get them to bed and under treatment with the appearance of the earliest signs of decompensation; (6) the early discovery and appropriate treatment of other chronic disease associated with the pregnancy, as diabetes, chronic nephritis, Graves' disease; (7) to diagnose nearly all diseases peculiar to the pregnant state at the earliest possible moment, chiefly these: threatened and missed abortion, mole, placenta prævia, toxemia of pregnancy, threatened eclampsia, pyelitis, occasionally separated placenta; to diagnose and appropriately treat venereal disease in pregnancy, a sociologic duty the importance of which cannot be overestimated; in the pregnancy clinic to carry along borderline cases of slight toxemia which will not, or cannot, be put to bed at home or in the hospital, and to follow these cases more carefully than is otherwise possible after bed treatment has relieved or diminished symptoms; (8) to guard against disastrous operative delivery, or the repetition of a previous disastrous operative delivery, by external and internal pelvimetry, and, more important, to make the decision for or against cesarian section for pelvic disproportion by a prelabor examination with or without an anesthetic. It may be open to question how valuable this examination, this effort to put the mature, or nearly mature, fetal head into its mother's pelvis is in border-line cases in which the decision is difficult between cesarian section and test of labor, and this is not the place for a discussion of that question, but it is undoubtedly of great value in cases of marked disproportion where cesarian is clearly indicated, to know this in advance of labor, to have the patient's responsible representative know it; it is time-saving in the matter

of permission for operation, and is a protection both to the patient and doctor. Nor can there be much doubt that to have a definite mental impression of what may be expected in a labor is an asset in the proper conduct of that labor. The detection before labor of outlet abnormality is, too, of importance. The question of outlet pelvimetry, of the width and height of the symphysis—especially in its bearing on the ease or difficulty of possible high-forceps application in border-line cases; the angulation of the arch, all are factors of importance in the decision for or against cesarian section, and are obviously assets to know before labor begins; (9) dystocia due to pelvic tumor, as impacted ovarian cysts, or lower segment or cervical fibroids, bicornate uterus, double vagina, cicatricial vaginal or cervical vaginal bands, cicatricial cervix, previous complete tears, with or without repair; possible or probable dystocia from previous abdominal operations, especially fixation of the uterus, are all detectable on prelabor examination and should be known before labor starts.

Such, then, are the many benefits we should expect to derive from prenatal care. It has been possible for me to study the question in point of fact as well as theory in the pregnancy clinic of the Boston Lying-In Hospital, established in May, 1911. Previous to this time, prenatal care was given to a considerable number of cases, differing in amount and character at different periods of the hospital's career, but there was no general systematic prenatal care. Since this time, practically all out-patients and house cases, that is to say, all cases delivered in their homes and in the hospital, have come under the care of the prenatal clinic systematically. From May 5th, 1911, to November 1st, 1916, 9,250 cases passed through the pregnancy clinic for prenatal care. It is impossible and undesirable in a paper of this character to give a minute analysis of the work and results in this large series of cases, and it is not possible at this time for me to make a direct comparison between the result of much of the work of the hospital before and since the establishment of the pregnancy clinic, but a consideration of certain phases of the pregnancy clinic work, which I will present, must carry but one conclusion, in fact, regarding its value as part of a lying-in hospital—and facts established by a prenatal pregnancy clinic are broadly facts established for all prenatal care.

Let us glance, first, at the pregnancy clinic, from the standpoint of growth, from its progressive educational point of view in the community. The following simple chart shows this:—

	Patients Treated	Number of Visits by Patients
1911.....	732	.....
1912.....	1,560	2,983
1913.....	1,881	3,540
1914.....	2,067	4,562
1915.....	2,126	5,657

This chart shows that the poorer and more ignorant public may be steadily educated to accept more and more the benefit of prenatal care.

Let us next consider, in so far as possible, what complications of pregnancy the pregnancy clinic has handled. This is possible in 4,996 cases. Of these, 1,524 showed some abnormality in pregnancy, 30 per cent.; albuminuria without other signs of toxemia, 361, 7 per cent. of all cases, 23 per cent. of abnormal cases; elevated blood-pressure without other signs of toxemia, 259 cases, 5 per cent. of all cases, 16 per cent. of abnormal cases; definite symptoms of toxemia, 195 cases, 4 per cent. of all cases, 12 per cent. of abnormal cases; contracted pelvis of varying degree, 401, 8 per cent. of all cases, 26 per cent. of abnormal cases; heart lesions, 111 cases, 2 per cent. of all cases, 7 per cent. of all abnormal cases. Phthisis, 10 cases; ante-partum hemorrhage, 33 cases, which is 0.7 per cent. of all cases; pyelitis, 20 cases; syphilis, 21 cases; gonorrhea, 10 cases; chronic nephritis, 5 cases; diabetes, 3 cases; with occasional cases of fibroids in the lower segment, ovarian cysts, and other complications to the number of thirty; also a large number of severe varicosities of the leg, and a small number of ante-partum phlebitis. These figures establish the fact that pregnancy is not the normal physiological process it is so broadly considered, and that prenatal care is valuable in 30 per cent. of pregnancies that are in some degree abnormal; and that the only way to include this 30 per cent. is to give it to all; and that with 4 per cent. of all pregnancies showing definite toxemic or pre-eclamptic symptoms, 2 per cent. of all pregnancies showing heart lesion, 8 per cent. of all pregnancies showing some degree of contracted pelvis, 0.7 per cent. of all pregnancies showing ante-partum bleeding; to go no further, prenatal care is not only valuable but is essential. The maternal death-rate in 4,340 cases observed in the pregnancy clinic and delivered in the hospital or in the patients' home under charge of the hospital, was 0.4 per cent., or one woman in each 230 observed; while the maternal death-rate in the hospital as a whole during this same period was 2 per cent. in 2,706 cases. These figures are not, of course, directly comparable because of obvious extraneous factors, but allowing for these they are suggestive. Both figures are considerably above the usual due to a streptococcus epidemic one year.

In 1912, 364 cases with symptoms of toxemia were observed in the pregnancy clinic, 25 severe enough to have hospital care; 2 mothers and 14 babies died; a maternal mortality of all cases of about 0.5 per cent. of severe cases of 8 per cent.; a fetal mortality in all cases of 4 per cent., of severe cases of 55 per cent. It is only reasonable to suppose that many of the milder cases would without prenatal observation have become severe with the consequent increase in mortality indicated by these figures.



In 1913, the rate of still-births per thousand, living births, for the pregnancy clinic was 28.9; that for all Boston being 39.8, and for the Borough of Manhattan 48.6.

These figures establish the fact that prenatal care reduces the maternal mortality from toxemia of pregnancy, that it reduces maternal mortality in general, that it reduces fetal mortality from toxemia of pregnancy, and that it reduces fetal mortality in general.

Certain other data may be brought as evidence: I have analyzed all valvular heart cases observed in the pregnancy clinic from May, 1911, to July, 1915, in 7,200 pregnant women, in comparison with all valvular heart cases treated in the hospital from January, 1873, to June, 1915, in 22,000 pregnant women. There were in the 7,200 pregnancy clinic cases 102 available for study that had chronic endocarditis. Of these, under pregnancy clinic care, 83 showed no signs of decompensation, 19 decompensated to some degree, 2 died, a maternal mortality of 10 per cent. in the decompensated cases, of 1 per cent. in all cases. In the hospital 22,000 cases, 62 cases showed decompensated valvular disease, 15 died, a maternal mortality of 33 per cent. in the decompensated cases. It is not possible, unfortunately, to determine the percentage of mortality in relation to the whole number of cardiac cases in the hospital, or to show the percentage of decompensation to the whole number of cardiac cases in the hospital series, because we cannot be sure of the number on account of old defective records; but, by arbitrarily dividing the decompensated cases into the first and second degree decompensation, according to the severity of the symptoms, we can show that cardiac cases get to hospital under pregnancy clinic care in better shape for delivery than they do without it. Briefly the figures are as follows: One woman in three hundred and sixty pregnant women had decompensation in the hospital series, whereas one woman in three hundred and eighty in the prenatal series showed decompensation; but in the hospital series twenty women had slight or first degree decompensation, forty-three women had severe or second degree decompensation, whereas in the pregnancy clinic series, nine had first degree decompensation, and eight second degree decompensation. The difference in incidence percentage in the two series checked up by the ratio percentage of the two series may therefore be assumed to represent the efficiency of the prenatal clinic in taking care of first degree decompensation, cases which formerly were left to themselves to develop second degree decompensation or not as chance determined. Fifty per cent. of the prenatal series showed first degree decompensation, 50 per cent. second, as against 33 per cent. first degree and 66 per cent. second in the house series. In other words, prior to the days of the prenatal clinic, the hospital failed to care for a certain definite percentage of first degree decompensated cardiacs. From a practical standpoint,

a certain proportion of first degree cases became second degree by neglect, and entered the hospital, or were cared for outside, as such. This establishes the fact that prenatal care is essential to the proper care of valvular heart cases in pregnancy.

We may now compare the result for the hospital cases in toxemia of pregnancy for the five years, since the establishment of the prenatal clinic with those of the previous five years. Here again certain extraneous factors somewhat invalidate our conclusions, but the importance of these is minimized by the rather prolonged periods considered, and the large number of cases under consideration. Before the establishment of the pregnancy clinic in the years 1906, 1907, 1908, 1909, 1910, in 4,369 cases there were 34 deaths from toxemia, one in 128. After the establishment of the pregnancy clinic, in 1911, 1912, 1913, 1914, and 1915, in 4,452 cases there were 26 deaths from toxemia, one in 171.

Regarding the other major obstetrical complications, placenta previa, certain facts stand out. In ten years, 1906 to 1915, 20 cases of placenta previa died in the hospital—many of these were moribund on entrance; yet so far as the records show, no case presenting itself at the pregnancy clinic with ante-partum hemorrhage, and accepting hospital care, has ever died, and the only two years of the ten in which there was no maternal mortality in the hospital from placenta previa were years since the establishment of the pregnancy clinic.

It requires no statistical proof to show that fetal mortality and maternal morbidity and mortality are reduced in contracted pelvis by pregnancy clinic care; which permits all cases to be diagnosed before labor and elective cesarian section to be performed when the pelvic contraction in relation to the baby is such as to warrant it.

Two other points need to be mentioned in concluding this part of the paper, in which the pregnancy clinic is of distinct benefit. One is the use of the pregnancy clinic for the instruction of students; (2) the amassing of accurate data as a basis of study for the advancement of the science of obstetrics. Lately, the clinic has been used for teaching in the department of obstetrics in the Harvard Medical School. This teaching has been accepted with marked enthusiasm by third and fourth-year students who parallel their pregnancy clinic with deliveries in the patient's home under competent instruction. On an average morning, each student, besides taking histories which are corrected and improved by the staff officer in charge, and seeing the ordinary routine of prenatal care in old cases, examines from five to ten new patients, his work checked up and corrected on the patient by the staff officer. It is impossible in any other way, or in any other department of the hospital to concentrate so much solid instruction into such a little time, and it is possible nowhere else to see that it penetrates so well. A black-

board in the clinic in a room away from the patients and a convenient fetal skull and bony pelvis, make it possible to illustrate readily and pound in facts, and the next patient examined by the student gives the instructor a chance to see if his teaching has taken.

The students are used singly as assistants in the clinic and conducted in this way, there has been practically no complaint by patients, and no falling off in the size of the clinic. On the whole the patients are favorably impressed with the added attention.

In regard to the second, the amassing of accurate data for study, it should be borne in mind that this clinic is the largest *controlled* pregnancy clinic in the world at present. There are larger clinics, and smaller ones controlled, but there is none handling more patients in which the follow-up system is practically perfect, in which prenatal direction of patients is carried to so complete a degree. One example of the accurate work from this amassed data shows its possibilities: F. C. Irving's "The Systolic Blood-Pressure in Pregnancy: Observations on 5,000 Consecutive Cases in the Pregnancy Clinic of the Boston Lying-In Hospital." Of these 5,000 cases, 4,472 patients were delivered by the hospital or out-patient services, and their subsequent obstetric histories are definitely known. This between the short period of February 28th, 1912, and March 11th, 1915. It was possible for Irving to draw the following very definite and valuable conclusions from his work:—

1. In 80 per cent. of pregnant women, the blood-pressure ranges from 100 to 130.

2. In 9 per cent. the blood-pressure may be below 100 once or more; a blood-pressure below 100 does not mean the patient will have shock unaccompanied by hemorrhage at the time of confinement.

3. In 11 per cent. of cases, the blood-pressure may be above 130 once or more. Age, nationality and parity seem to have some influence on blood-pressure. High blood-pressure in the young is more frequently a sign of toxemia than in those over thirty.

4. Elevated blood-pressure is more commonly an index of toxemia than is albuminuria, and it is apt to be an earlier sign. The degree of elevation points more surely to the likelihood of toxemia than does the degree of albuminuria. Both, however, are of the utmost importance.

5. Isolated cases of elevated blood-pressure unaccompanied by albuminuria or evidences of toxemia occurred not infrequently. Usually they responded to free catharsis. Some pressures remained elevated in spite of treatment, and apparently were normal, during pregnancy at least, for the patients who exhibited them.

6. A progressively rising blood-pressure, often from a low level, even though it never reaches the arbitrary danger point, should be



regarded with apprehension as a most valuable sign of approaching toxemia.

7. Toxemia is much more common with a blood-pressure above 150 than it is below that point.

8. Most cases of eclampsia occurred with a pressure of 160 or more. Eclampsia may, however, occur with a pressure of only moderate elevation.

9. All toxemics developed both albuminuria and elevated blood-pressure.

10. While the incidence of eclampsia in this series is about the same as the figures usually given, it is significant that two-thirds of the patients who developed convulsions absolutely neglected advice and refused to return to the clinic. Had these patients been discharged against advice during pregnancy for disobeying instructions, very favorable statistics would have been obtained. The hospital feels that it would be most unjust to the ignorant foreigners who constitute the vast majority of its patients, to desert them when they most needed skilled hospital care. With proper cooperation from the patients, and eliminating the fulminating cases which develop in a few hours, there is no doubt that eclampsia should be practically a preventable disease.

If it is possible to produce so valuable a study in three years of pregnancy clinic so run, it is tempting to think of what might be accomplished in ten, fifteen, or twenty-five years, if such a clinic existed in every community in the country large enough to support one.

Turning then from feats of commission to errors of omission, we may conclude with the consideration of postnatal care in general, and postnatal care as it should be conducted in the pregnancy clinic. Regarding postnatal care in general, I pointed out in the beginning that it is much neglected. I consider it extremely important, and that usually it is also prenatal care. At first, it was apparently the idea to include adequate postnatal care among the duties to the community which our pregnancy clinic served. Certainly, at first, many postnatal cases reported, at least once, to the clinic. These rapidly fell away for reasons which I cannot be sure of, but which probably were lack of interest on the part of patients and lack of resources and time and of follow-up nurses. It is my belief that this clinic and every other pregnancy clinic, whenever its resources permit, should make provision for postnatal care as systematic and absolute as its prenatal care.

Postnatally there are two patients to consider: the mother and the baby. The baby may be dismissed from our consideration; it belongs to the pediatrician in private practice and to milk stations medically supervised or pediatric clinics in hospital practice. This is adequately looked after hereabouts by the "Milk and Baby Hy-

giene" with its milk stations. In private practice, the obstetrician may supervise his baby to a greater or lesser degree according to his own beliefs or his patients' wishes, but when he is so engaged he practises pediatrics, not obstetrics, and so may be dismissed from our consideration. The mother belongs to the obstetrician and the pregnancy clinic, until such time as she is as nearly as possible where she was before pregnancy and labor; an indefinite period but one which lasts until the baby is weaned or, in early bottle babies, for a period of some weeks or months—not days. It may at any time be wise to make a given patient a medical case, but before this is done, the obstetrician or pregnancy clinic must be sure that in matters relating to or resultant from the pregnancy and labor the patient is in her best condition. The only way to see to this is by some method of definite time supervision.

The period following discharge from the obstetrician or hospital is the favorite period for a woman to drag herself into a state of permanent or prolonged ill health, or relative incapacity for living at her best. What factors cause this and how may they be effectively checked? The answer to this question constitutes post-natal care. The first factor requiring supervision is the period of rest in bed, and the period of getting up and about. Rest in bed should be kept up until the fundus is involuted below the symphysis in normal cases; not, I believe, an arbitrary number of days. This usually takes more than ten days or less than three weeks. If this takes place by the fourteenth day, I think the next week should be spent getting the patient up slowly, and I consider a third week in bed so much wasted time. If the fundus does not involute by the twenty-first day, I think the patient should then be allowed to get about, but more slowly than as though it had properly involuted. If bleeding occurs, she should be put back to bed, but I believe that many uteri which do not involute well in bed will do so rapidly with the improved circulation when the patient is up.

The second matter requiring very careful supervision is that of getting the patient up and about. It is as possible to do harm by doing this too slowly as too quickly—the third to the sixth week should be absolute routine, modifying the routine somewhat with the circumstances of the patient and the speed with which she recovers her strength. Briefly, it should consist of definite hours of rest and activity; the activity in my opinion being fully as important as the rest. The patient should be carried on to activity as rapidly as possible, but always stopped just short of tiredness. At first she is allowed up half an hour a day; this is progressively increased; walking a few steps begins at the end of the third week; the fourth, fifth, and sixth week, small but progressively increasing amounts of morning and afternoon exercise are ordered, two-hour rest periods, undressed, each afternoon, gradually cut down to

one hour, which is persisted in as long as the patient nurses, or for six months if the mother does not nurse. At the beginning of the sixth week, definite early morning and night light gymnastic exercises are begun, with a view to increasing or replacing lost muscle tone in the abdomen. By the ninth week, the patient should be, and normally is, in absolutely good condition.

The third matter which requires supervision is the matter of retroversion. Many retroversions follow pregnancy. It is not enough because they frequently replace themselves with a return of muscle tone, or because nearly all will come back by a systematic use of the knee-chest position, to dismiss a patient with a retroversion, in the hope that this outcome will occur—the patient should be watched long enough to see that it does occur. It is not safe to turn a patient loose in the medical world with a retroversion until several months after delivery; not so much on account of what might happen to her because of the mal-position, which is frequently nothing, but on account of what may be done to her because the mal-position is discovered. I have recently taken a case through pregnancy and labor, during which the patient vomited blood on several occasions and showed blood in the stools. She was on a gastric ulcer diet under the charge of a competent medical man the last four or five months of her pregnancy. Some three weeks after delivery, her gastric symptoms recurred; she was *x*-rayed very carefully, and a prolonged bed-treatment recommended by her internist, who suggested that she *might* benefit by exploratory laparotomy in the hands of a good surgeon. Her circumstances not warranting this care in a private hospital, she was sent with a careful history to one of our best hospitals, whose pride is that it does all specialties better than the specialists. The patient was at this time extremely run down, due to her pregnancy, her gastric condition and her home surroundings. She was studied at this hospital with painstaking care, re-*x*-rayed, and no evidence of gastric ulcer found, but on vaginal examination, *in the fifth week of her puerperium* she was found to have a retroversion; laparotomy for suspension was advised, and she was told that this would help her condition. She fled to the country with a pessary I put in the day she took the train, and two months later reported with the uterus in position, where it has stayed, with a return of muscle tone and improved general condition. If one of the best hospitals in the country wishes to operate on a rundown woman with a gastric ulcer history, for a freely-movable retroversion, five weeks in the puerperium, what chance has such a woman if she is turned over to the medical world in general? It is essential for the obstetrician to protect his patient by getting her as nearly anatomically perfect as she was before he discharges her.

The fourth matter that requires supervision is abdominal sup-



port. This is truer among women who must work soon than among those who need not; truer among those who have frequently repeated pregnancies than those who do not; truer among women of poor muscle tone and lax abdominal support than among those with good abdominal muscles and general good health. Many women suffer much unnecessary peripheral irritation from backache following pregnancy; the etiology is not the point here—good corseting from the outset of getting up is essential to prevent it; many women suffer from symptoms of abdominal relaxation—*ptosis with symptoms* following childbirth; good corseting will prevent it. The details of this corseting must be supervised by the attendant. He need not do the work, but he must be sure that whoever he delegates to do it knows what he wishes to attain—namely, a sufficient support for back and abdomen, and to see himself that this object is obtained. The details of this matter need not be discussed here, nor is it of importance to discuss whether ptosis is or is not a disease entity. Experience shows that what I have described occurs: pregnancy has stretched out the abdominal walls and thinned the muscles; after labor there is relaxation followed by involution of the abdominal wall. It frequently is only partial by the time the patient is up, and the abdominal wall is not as fit as before for supporting full intestines which, deprived of normal support, will sag, causing pull at the point of visceral attachment. It requires exercising and improvement of general condition to correct this, and in the meanwhile good corsets, carefully put on, serve as a support and prevent both the anatomical stretching of visceral attachments and the symptoms of undue weight-bearing, which too are puerperal irritants to the nervous system of the mother. To what extent the patient regains the tone of her abdominal muscles depends chiefly on her willingness to spend time exercising them and to keep to a routine which makes for good general condition. I am struck with the fact that among my own patients, one year after delivery, those who were in the worst condition are certain women, who, while willing to admit the competency of my prenatal care and operative ability, refused, I suppose, to consider that the abdominal support post-partum was of any importance, and who went without it because it was easier than to pay attention to this important matter. They put on corsets for parties, but looked after the baby and housework in a kimona. It would have been better for their health if they had reversed this process.

The next matter that needs supervision for some time after labor is constipation. Many women, in the army of chronic constipation, date their ailment from pregnancy and labor. We, as obstetricians, usually start them by necessity in pregnancy or the puerperium; this being our work, we should correct it as completely as possible before the patient is out of sight. The substitution and withdrawal of ca-

thartics after labor requires more supervision than we give it. Diet, exercise, good corseting, fluid intake, reduction in drugs, use of oil, abdominal massage, should leave our patients at least as well off as we find them in this respect. It is silly enough to leave it to the patient herself; it is sillier yet to discharge a woman to her medical adviser for constipation following pregnancy unless we have exhausted our ability in this line. It may take a few months' supervision; we should give it.

The next matter which requires supervision is weaning. It seems at first sight as though this was pediatrics and in so far as substitute feeding goes, it is, but the decision when to wean from the mother's standpoint, and the care of the breasts during weaning are the obstetrician's business. Women as regards nursing and care of the baby seem to be divided broadly into two classes: (1) Those who do not wish to nurse or look after the baby at all; and (2) those whose obsession it is to nurse forever and look after their children entirely, whatever drag it places on them. It is equally our business to guide rightly the latter as the former. All admit that the baby must be nursed if possible; many wish to prolong nursing too long. There comes a time when many nursing mothers should stop nursing for their own sake. This is in time reflected in the baby's condition, and weaning takes place from the baby's necessity. In the interval, the mother struggles along and goes backward. When this time is, or how long the interval, differs in each case, and the only way to tell is to watch the patient's general condition, her looks and her weight. All the good results of careful prenatal care, careful care in labor, careful routine after labor, may be undone in this interval of attempted nursing after the mother has done her bit; nor should the new mother be allowed to devote her entire time to her baby's care when circumstances permit it to be otherwise. When this is done, it is often only an exaggerated sense of duty and a lack of system in the matter.

Such are the chief functions of postnatal care. There are others that come up from time to time, which the outlined routine of supervision will readily cover. I have said nothing of the distinctive pathological conditions arising from pregnancy. It is my belief that these should be met by the obstetrician and pregnancy clinic and lying-in hospital before the patient passes out of their sight. Every obstetrician should be competent gynecologist enough to clean up after himself. Every pregnancy clinic should have ample room and facilities to give gynecological treatment necessitated by labor to its own cases, and every lying-in hospital should have beds and operative facilities to repair damage incurred in the process of the birth of its babies. It is not necessary for the obstetrician to pose as a gynecologist, if he does not wish to, or feels himself incapable. It is not necessary and perhaps not wise for the pregnancy clinic or

lying-in hospital to bid for independent gynecological clinics, but they should be able to put their own patients back where they were; to relay a patient to a gynecologist, or a hospital patient to an independent gynecological clinic for a secondary perineorrhaphy, for instance, is to waste time, destroy the confidence of the patient in her obstetrician or lying-in hospital, permit criticism which, owing to unknown circumstances, is not justifiable, and make a double set of records in separate places which to be of use should be together in one place. Beside, it cannot be denied that an obstetrician is a better man to have in case of an obstetrical emergency in private practice, if he is accustomed to do abdominal and vaginal gynecology, and that the staff officers of a lying-in hospital are better staff officers for the handling of the more frequent obstetrical emergencies in hospitals, if they are accustomed to do abdominal and vaginal gynecology. If an obstetrician claims the right or ability to do a Porro-cesarian, as he may have to do rapidly in any cesarian, or to remove a complete ruptured uterus or do a difficult vaginal cesarian, he must keep up his manual dexterity in this line and his familiarity with the field by abdominal and vaginal gynecology. It is impossible for him to do this by simply meeting obstetrical emergencies as they come up, because they are on the whole so rare. This rarity which makes it possible for a man to get by as an obstetrician without this dexterity and familiarity only obtainable by constant practice, is the very reason why he needs to do abdominal and vaginal gynecology; this, not with the idea necessarily of being a gynecologist, but of being a first-class obstetrician. I think this is the opinion and practice of individuals in most parts of the country, but in others it is not.

This postnatal work in a pregnancy clinic demands only a follow-up nurse and an extra examining and treatment table in an extra room. Each patient on discharge from the hospital, or on the last visit of her attendant if delivered in the out-patient department, should have a card with a date on it requiring her to report on that date. If she does not, the follow-up nurse should see why, and explain to her she must report or she cannot again be looked after by the hospital. After this first visit, the patient would fall under control for the remainder of her post-partum care as above outlined. Without wishing to be considered a visionary or a humorist, it is no light thing to know what can be easily estimated, that from the establishment of the pregnancy clinic in May, 1911, to November, 1915, the 10,000 patients who have passed through it will have spent by August, 1916, somewhere between \$75,000 and \$120,000 for cathartics. It is hard to think of anything that is as purely economic waste, as unnecessary or preventable catharsis. Not all this money could be saved nor catharsis stopped by postnatal pregnancy clinic



care (nor is the economic side the most important), but it could be reduced to a minimum.

From the above, it seems permissible to draw the following conclusions:—

1. Pregnancy clinics for prenatal care will grow if started, will be accepted by the people, and will educate them rapidly to an appreciation of the value of prenatal care.

2. Thirty per cent. of pregnancies show some abnormality.

3. Four per cent. of pregnancies show definite symptoms of toxemia.

4. Eight per cent. of pregnancies show some degree of contracted pelvis.

5. Seven-tenths of one per cent. of pregnancies show ante-partum bleeding.

6. Two per cent. of all pregnancies are complicated by valvular heart disease, 17 per cent. of which decompensate to some degree under pregnancy clinic care.

7. Prenatal care reduces maternal mortality on the whole, especially from toxemia and eclampsia.

8. Prenatal care reduces maternal mortality in placenta previa.

9. Prenatal care reduces maternal mortality in contracted pelvis and morbidity following labor in these cases.

10. Prenatal care gets cardiac disease complicating pregnancy into the hospital for treatment when decompensation is slight, and so reduces maternal mortality in this condition.

11. Prenatal care reduces still-births.

12. Prenatal care reduces fetal mortality in contracted pelvis and in toxemia.

13. The pregnancy clinic offers an ideal place in which to teach many sides of obstetrics.

14. Pregnancy clinic material, in the well-conducted clinic with a good follow-up system, run with a hospital, offers very valuable data in the study of obstetrics.

15. Postnatal care is nearly, or quite, as important as prenatal care, and except in one-child sterility is essentially prenatal care, and should be extensively incorporated into the work of the individual obstetrician, of a pregnancy clinic, and of a lying-in hospital.

## FORCEPS ROTATION IN PERSISTENT OCCIPITOPOSTERIOR POSITIONS WITH A REPORT OF CASES.

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In presenting this subject I am going to assume the attitude of one who is continuing the discussion of a paper read before a medical society; and will remark that Dr. George L. Brodhead, in his article on "The Treatment of Persistent Occipitoposterior Positions" (*New York Med. Jour.*, April 1st, 1916) was so thorough in his discussion, that there remains little to be said except to give personal experiences.

The occiput lying in the posterior position in primiparæ and in certain multiparæ, is a complication of labor; and when it *persistent*, is the cause of a dystocia, which may result in the most serious consequences: on the part of the mother, resulting in a prolongation of labor with possible deep lacerations of the soft parts and sepsis; and on the part of the child, resulting in injuries from prolonged pressure against the vertex in expulsion; or from attempts at dragging the head through the pelvis with the forceps; or the child may even lose its life through a necessary craniotomy. One way to obviate these injuries and disasters, is to *rotate the occiput to the front with the forceps after it has reached the pelvic floor*. It is, however, stated in the textbooks that this should only be done by experts in the use of the forceps. This is very true, but it is not difficult to become an expert in the work, if one can see the method sufficiently demonstrated on the manikin, and on the patient in labor. To quote an expression from Dr. J. Whitridge Williams: "We approach these cases with equanimity." The argument of expertness applies to the mastery of any surgical procedure. I was taught the principles of forceps rotation by Dr. Brodhead; he was taught by such an expert as the late obstetrician, Dr. E. A. Tucker of the Sloane Hospital for Women, etc.; so that actual demonstrations handed down have brought about expertness. In reviewing the case histories at the New York Post-Graduate Medical School and Hospital a few days ago, I noticed that for many years the House Staff men in the obstetrical out-patient department had rotated the occiput with the forceps from posterior to anterior, with no harm whatsoever—they had been taught how and when to do it.

In order that forceps rotation may be properly performed, the *vertex must be low in the pelvis and preferably not until it has*

reached the pelvic floor and is even on the point of distending the vulva. Forceps rotation in occipitoposterior positions is indicated only in cases where it is *persistent*, *i. e.*, where the occiput is unduly delayed or will not rotate to the front; after it is in the cavity; or on the perineum.

About 95 per cent. do rotate spontaneously, but one can generally tell when he has to do with one of the remaining 5 per cent.: either suspecting it from the long tedious labor; or having made out the probable position by inspection of the abdomen and by abdominal palpation; or by vaginal palpation of the vertex; making out the *anterior fontanelle anteriorly* after it has sufficiently advanced so that it is possible to reach it with the examining finger; or before this can be done by feeling the posterior fontanelle posteriorly. The convexity of the ear is also a landmark for the direction in which the occiput points. The forceps may, however, be *applied* to the sides of the head at any point in the birth canal where the forceps is permissible, and traction may be made, *simply to bring the head lower*, but not attempting to rotate it. If, however, while making traction, or simply after applying the blades, the head commences to rotate spontaneously, the rotation may be allowed to proceed and may be favored. Before proceeding with the rotation, the following conditions, as Brodhead says, must be observed: "The diagnosis of the position of the occiput must be positive, *i. e.*, whether right or left posterior; right or left anterior; or transverse. The membranes must be ruptured; the rectum and bladder ought to be empty; the head flexed as much as possible; the vertex well down in the pelvis, and preferably at the *vulva* outlet."

In this as in all obstetric deliveries and extractions, I have the patient arranged upon a table; if in a house generally upon a kitchen table. The thighs are held up in the lithotomy posture with a twisted sheet; and an anesthetic, generally chloroform, is administered either by a physician or some household attendant. The patient in all forceps extractions should be kept perfectly quiet by the anesthetic; and always in primiparæ, when the head is distending the vulva and emerging, the anesthesia should be pushed to the surgical degree; and with the pains shut off, the head should be extracted entirely by the operator, the *thighs* at the same time *being brought down* to permit the vulva to distend more readily and to prevent or lessen laceration of the perineum.

*Application of the Forceps, Traction, Rotation and Extraction.*—The general mechanism may be observed in the description of labor in the cases reported below, special attention being given to the following points: The Tucker McLane solid blade forceps is the best for the work. This forceps has rapidly gained in popularity until it is now extensively used. It is the most easily introduced and withdrawn; and if the blades are kept within the axis of the birth



canal so that their tips will not strike the soft parts of the mother while rotating, they will do no harm. I rarely see a mark on the child's head from its use. There is no possibility of tearing off an ear when removing the blades. The blades are applied to the sides of the head. If the position is R. O. P., the left blade is introduced first, the pelvic curve (concavity) and the tip of the blade pointing toward the *forehead*.

The steps followed in the introduction of the blades, are those advocated by Dr. J. W. Markoe, and taught by him and by Dr. Ross McPherson at the Lying-In Hospital of the City of New York: The pelvic curve of the blade is passed in, hugging the subpubic arch, until its tip touches the presenting part; then the blade is rotated so that the cephalic curve lies flat against the side of the head; and finally the handle is depressed and the blade again so rotated that it passes upward into position. This applies to the introduction of both blades.

After locking the forceps, if the position is R. O. P., carry the handles toward the mother's left thigh so that the *blades* will remain straight in the line of the birth canal. Now gently, using *no force*, turn the handles outward toward the mother's left thigh, as you would turn the knob on a door, to bring the occiput to R. O. T. (right occiput transverse). As the occiput comes upward and forward, the sinciput with the anterior fontanelle goes downward and backward. After bringing the occiput to R. O. T., hold it there until the patient has had two or three pains, to prevent its subsequent backward motion; an assistant, anybody, pushes the child's back toward the median line of the mother, which prevents the child's neck from being twisted. Now rotate the occiput to R. O. A. by carrying the forceps *handles* further downward and to the mother's left as before; and hold it until two or three more pains have passed. After bringing the occiput to the position R. O. A., in many instances it will advance spontaneously, rotating to O. A. (occipito-anterior). One must be on one's guard at this time lest the head advance too rapidly and, before the forceps can be removed, shoots out, lacerating the perineum in spite of all the care taken to avoid it. If, however, after bringing the occiput to R. O. A. it does not rotate and further advance, it is rotated again with the forceps to O. A., by carrying the handles further downward, until they point toward the floor, and may require extraction until the biparietal diameter is within the grasp of the vulva. It is then generally advisable to remove the blades, and with the uterine pains still in abeyance, to extend slowly the head, being very careful, in extracting the *nose and chin* with their cutting propensities, not to tear the perineum.

*Treatment When the Occiput Remains in the Persistent O. P. Position.*—If the head cannot be rotated—and here we wish to em-

phasize the fact that *no force be used*—and the occiput remains posterior, having to be born in this position, the following mechanism should be observed: Bring the head down until the forehead appears beneath the pubic arch; then the occiput is brought upwards over the perineum; and finally the head is made to drop backward in extension, so that the brow, nose, mouth, and chin will follow.

The injuries to the soft parts in unrotated occipitoposterior positions are due to their distension by the *long occipitofrontal diameter*. By rotation, the short sub-occipitobregmatic diameter is substituted, as the occiput comes under the pubic arch.

A report of cases illustrating the principles is herein presented:—

CASE I.—Mrs. R., æt. twenty-seven, Para II, July, 1916. Spines 26 cm., crests 28 cm., left oblique 21 cm., diagonal conjugate 19 cm., R. O. P., forceps rotation. The first stage of labor commenced at 7 a. m., July 23rd, 1916. The patient had taken castor oil the day before. On arrival at 1 p. m., July 23rd, the cervix was three fingers dilated, thin, and pains every five minutes and not very strong. At 3 p. m. the uterine contractions caused suffering. For this a hypodermic of morphine 1/6 gr. and atropine 1/120 gr. was given. At 4 p. m. the patient was placed on the kitchen table; the vertex was in mid-pelvis and not advancing. The child's back had been located well to the mother's right side and the fetal heart sounds were heard in the right lower quadrant of the mother's abdomen. The membranes had ruptured, but this had not been noticed. It was practically a dry labor.

*Signs showing that the fontanelles may be mistaken for one another:* Upon vaginal examination the anterior fontanelle seemed to lie at the mother's right posteriorly; but the child's back lay at the right side of the mother. This being the case, the anterior fontanelle could not lie at her right. Two fingers of the right hand of the operator were then passed into the vagina again and well up to the mother's left; and there the anterior fontanelle was distinctly made out: large, diamond-shaped, and with the four sutures passing outward from it. This established the diagnosis of right occipitoposterior. The blades of the forceps were applied to the sides of the head, as in L. O. A.; the left blade first, on the slant, then the right blade. They locked easily. Light traction was made, at the same time favoring rotation which had commenced; and to keep the blades of the forceps exactly in the line of the birth canal while rotating, the *handles* of the forceps were carried well to the mother's left thigh. The occiput was gently rotated to R. O. T., then held there for a few pains to pass; and then the handles were carried downward in the direction of the floor as rotation was continued, to bring the occiput to R. O. A. After holding it there for two or three more pains to pass, the vertex now slightly distending the vulva and with the handles of the forceps pointing still further downward toward the floor, the blades were removed; but as the head did not advance further, neither did rotation; from now R. O. A. to O. A. took place; the blades were reapplied to the sides of the head as ordinarily for R. O. A., and rotation to O. A. was then completed. The occiput now advanced easily; and when the biparietal diameter was in the grasp of the vulva the blades were again removed and the rest of the delivery was spontaneous. The occiput was held back by the operator's hands, to permit extension to take place slowly, and to permit the forehead, nose and chin to come up carefully over the perineum, at the same time favoring the descent of the occiput beneath the pubic arch. The perineum was not torn. I was also in attendance upon this patient in her first labor, which required low forceps extraction; the position of the occiput was anterior from the beginning.

CASE II.—Aet. twenty-one, Italian. Para I, height 4 ft. 11½ in., weight 127 lb., crests 28 cm., spines 25 cm., left oblique 21 cm., external conjugate 19 cm. The diagnosis of position in the eighth month of pregnancy, April 14th, 1913, was R. O. P. Diagnosis made by abdominal palpation, by locating the child's back well around at the mother's right and the child's small parts near the median line of the mother's abdomen, with the fetal heart sounds extending around to a point near the junction of the mother's right side and back. Before labor there were scattering pains for several days.

*Labor:* Upon arrival during the second stage, at 3 p. m., May 28th, 1913, the *contour* of the *abdomen* was classical for R. O. P. It was prominently rounded out on the right side and the fetal heart was heard in the right lower quadrant of the abdomen and extended to the limit of the right side. Upon *vaginal* examination the diagnosis was *doubtful*. At 3 p. m. the internal os was dilated except on the right side, where it was rigid and thicker. The membranes had ruptured high and the liquor amnii dribbled. The sagittal suture lay in the right oblique diameter of the pelvis; and a fontanelle was seemingly quite *apparent* at the *right* posteriorly. It seemed larger than the posterior fontanelle. The anterior fontanelle could not be felt; and as far as I could reach at the left, anteriorly, the head seemed to be round like the occiput; every irregularity of *contour* seemed to be at the right and posteriorly. The fontanelle which was felt posteriorly seemed to be more like the anterior. It is a condition like this which requires *careful judgment in diagnosis*. There was no perceptible change for six hours, *i. e.*, until 9 p. m., when under chloroform anesthesia the *anterior fontanelle* was felt *anteriorly*, high in the left side of the pelvis. *This was the final diagnostic sign for R. O. P.* The solid blade forceps was now applied to the sides of the head, the tips of the blades pointing toward the forehead; and traction was made intermittently, the blades being unlocked from time to time to relieve pressure upon the head. When the vertex was down to the floor of the pelvis it was rotated, the handles of the forceps being carried toward the mother's left thigh. The occiput was brought first to transverse (R. O. T.), then it was held for a pain or two to prevent its rotating back again; it was then rotated to R. O. A., at the same time carrying the handles of the forceps downward toward the floor. It was again held for a pain or two; the child's back being at the same time pushed by an assistant toward the median line of the mother's abdomen to relieve strain upon the child's neck; finally the occiput was rotated with the forceps still further around to O. A. The forceps having become inverted, the blades were removed, but the head did not advance; so the blades were reapplied as in ordinary O. A. position, and the head was extracted past the parietal eminences. The blades were again removed, and the second stage terminated at 10 p. m. The placenta was expressed Credé, at 10:20 p. m. There was a nick of about 1 cm. at each side of the perineum.

This case illustrates the point that sometimes it is *difficult to differentiate the fontanelles*. Owing to moulding of the head there may be a depression, *e. g.*, where the occipital bone is pressed beneath the parietals, forming an angle which feels upon palpation *like the anterior fontanelle*. Sometimes widely open 'sutures' may feel to the touch like the anterior fontanelle; when in doubt simply *wait* until the vertex advances further, perhaps being extracted further with the forceps until the anterior fontanelle either appears, or does not appear, *anteriorly*. *Never rotate the head until the exact position of the occiput is certain.*

CASE III.—Aet. twenty, Italian. Para III, August, 1913. Points touching upon the diagnosis of R. O. P. as illustrated in this case. Spines 24 cm., crests 26 cm., external obliques 20.5 cm., external conjugate 19 cm. During pregnancy the position, as made out, was R. O.; small parts at the left; fetal heart R. L. Q. 140. *Labor:* First stage unobserved; second stage: Upon arrival August 16th, at 8 p. m., the position was R. O. P. *Keep the posterior as well as the anterior fontanelle in mind.* If the abdominal signs are convincing



for right occipitoposterior and upon vaginal examination a fontanelle is seemingly felt at the right and *posteriorly*, it will be the *posterior* fontanelle; even though as occurs sometimes, it feels too large for this, the feeling of enlargement being due to the arrangement of the bones from moulding, simulating the anterior fontanelle. The anterior fontanelle is too high on the left side to be felt at this time. In 2 cases of R. O. P., I have been confused in this way. If the head is advancing spontaneously, time will bring the anterior fontanelle down, where later on it can be felt anteriorly. If the head does not advance and if the position is not clearly defined, and the forceps is indicated, place the patient on the table, and under sufficient anesthesia introduce the hand into the vagina; and if the anterior fontanelle cannot then be felt at the left and anteriorly, apply the forceps, the os being fully dilated. The direction that the blades take when applied to the sides of the head will show that the head lies in the *right oblique diameter*, which is the proper diameter for R. O. P. If with the child's back far around to the mother's right side, and with the fetal heart distinctly heard at the border-line at the mother's right side and her back, and vaginally a fontanelle is felt at the right posteriorly, the position must be R. O. P. These cases often require much moulding of the head, and as it was clearly demonstrated to myself in this case to-day, the head in moulding was elongated in the O. M. diameter, which accounted for the posterior fontanelle being easily felt before the anterior fontanelle came down. After the patient was placed upon the table and sufficient chloroform given, so that the hand could be introduced far enough, the anterior fontanelle was distinctly felt anteriorly, as a large diamond-shaped thin depression about 1 in. in area, with four sutures running into it. The confusing sign in 2 of my cases has been that the only fontanelle at first felt, notwithstanding the fact that it was at the posterior part of the pelvis, appeared to be too large for the posterior fontanelle. The second point to be remembered is that the anterior fontanelle cannot be felt until it comes down within reach of the examining finger, as it reaches up behind the pubic arch. In other words, in occipitoposterior cases, the *posterior* fontanelle sometimes may be felt *posteriorly*, *before the anterior fontanelle* can be felt *anteriorly*; and either the one or the other is diagnostic of occipitoposterior, whether right or left, except that the *anterior* fontanelle may sometimes be felt when the head lies *transversely* in the pelvis, or if it is *poorly flexed*. But in occipitoposterior cases the position of the child's back, as determined by abdominal palpation and supplemented by the location of the child's heart, will aid in establishing the diagnosis.

CASE IV.—Mrs. S., *æt.* thirty. Para I, July 16th, 1916. Dry labor. R. O. P., forceps rotation, cord around the neck, perineum intact, no hemorrhage. Child 8-9 lb. I was called in consultation at 5:50 p. m. The occiput had been on the perineum two hours, second stage completed at 6:25 p. m., third stage completed at 6:50 p. m. *History of the Labor:* The membranes ruptured at 9 p. m., July 15th, 1916. First stage (pains began) 12 p. m., July 15th. The patient was attended by Dr. ——— until 5:50 p. m., July 16th. Patient had been given 1 c.cm. pituitrin at 3 p. m., July 16th, which produced one or two pains only. Upon arrival at 5:50 p. m., July 16th, patient was placed upon the kitchen table for examination. The *vertex* was partially *distending the vulva*, where it had been for two hours; the thighs were now tied up with a sheet and chloroform given. With rubber gloves on, I passed the hand in and surrounded the occiput, which was posterior. The *anterior fontanelle* was obscured and the occiput was nearly O. P. As further aid in defining the position, I made out the back, at the patient's right side far around, and the small parts at the left near the median line, indicating an R. O. P. position. Left blade of forceps applied, then the right blade; forceps locked easily, the handles were carried to the patient's left thigh and rotation commenced; the head advanced slightly, and, as it further distended the vulva, it rotated more readily. After it was rotated around to R. O. A., the blades were removed and

the patient's thighs were brought down straight to relax the vulva; then the head was carefully extracted without tearing the perineum. The cord was round the neck once, but was easily placed over the head. The child, a female, was well nourished and weighed about 9 lb., and was born in good condition. The uterus contracted firmly, a drachm of ergot being given after the placenta was expressed.

CASE V.—Mrs. E., *æt.* twenty-nine. Para I, January 25th, 1916. Spines 25 cm., crests 28 cm., left external oblique 22 cm., external conjugate 18 cm., true conjugate q. s. Circumference of abdomen at term 40 inches. Twins: First twin L. O. P., fetal heart 200 (still-birth). Immediately before birth fetal heart was 200. First stage of labor commenced January 23rd, slight pains in back; stronger pains January 24th, a. m., evening, every five minutes, but external os only one-fourth dilated, cervix taken up. 9:20 p. m. hypodermic injection morphine 1/6 gr.; atropine 1/120 gr. Pains stopped for several hours; recommenced the following morning, but at 5 a. m. there was no further dilatation of external os, and I went home. January 25th, 7:30 p. m., I was sent for again; pains every three minutes, and strong, but the external os admitted only one finger, and was very thin. Fetal heart 200. I sent for Dr. — to give chloroform. Patient placed on kitchen table, vagina dilated manually; ring inside introitus firm and thin. External os was also slowly dilated manually with one finger, then two fingers, then three fingers, etc.; vertex low in pelvis, down to spines of ischium. *Anterior fontanelle* at mother's right, easily felt (L. O. P.). After sufficient manual dilatation of vagina and external os, the forceps was applied: right blade first; vertex drawn down past the spines in L. O. P. position, and then further downward until the biparietal diameter was past the tuberosities. It was then rotated to transverse, then to L. O. A.; then the forceps being nearly inverted, the blades were removed and reapplied; and after more rotation to O. A., carrying the handles well downward, the blades were again removed as the head was born. The chin was made to advance by pressure upon it upwards, posterior to the anus. The cord was compressed to a mere string; the child never breathed; there was no heart action. After a few minutes the mother's abdomen showed considerable commotion; a second twin was diagnosed and was quickly born; this also was a vertex presentation; it lived. Placenta, Credé, of large dimensions. Its weight estimated at 3 lb. or more. There was one placenta and two cords. Slight perineal tear: one vaginal, at the left—one suture; one central perineal—two sutures. Puerperium normal.

CASE VI.—*Æt.* twenty-nine. Para III, December, 1914. R. O. P., forceps rotation. First stage began December 5th at 8 p. m., R. O. P. Cervix not completely dilated, December 6th at 9:30 a. m.; but as the case was not progressing, the biparietal diameter not being fully through the inlet, and strong labor pains being present, the forceps was applied at 9:30 a. m., December 6th, *high forceps*; and when traction was made after the head was in the cavity, it showed a tendency to rotate. This was favored and easily turned to transverse, then to R. O. A., and then to O. A. The anterior lip of the cervix came down in front of the head to the vulva; it was visible and thickened. It was finally pushed up over the occiput while the latter was distending the vulva. Earlier in labor during palpation of the abdomen the position seemed to be L. O. A., with the back seemingly at the mother's left, small parts seemingly at her right abdomen; but upon vaginal examination the anterior fontanelle was easily distinguished anteriorly and at the mother's left. During extraction there was considerable hemorrhage from the artery in the cervix. When the vertex was at the vulva the hemorrhage stopped. This case illustrates the point that sometimes it requires very careful examination to diagnose the position and to make the findings by abdominal palpation and vaginal touch correspond.

CASE VII.—*Æt.* twenty-three. Para I, L. O. P. Forceps rotation. Case seen in consultation. Patient thinks she was beyond term. First stage commenced at 2 p. m., December 5th, 1915; membranes ruptured spontaneously,



December 6th. Upon arrival at 3:30 p. m., December 6th, pains were every five minutes, internal os three fingers, thin ring, L. O. P., midpelvis; spines of ischium were not yet passed; spines prominent. Advised waiting one and a half hours for the cervix to dilate fully. At 4 p. m. hypodermic injection morphine, 1/6 gr., and atropine 1/120 gr. was given. Internal os at 5:30 p. m. was sufficiently dilated. Median forceps applied, right blade first, the occiput brought down to the pelvic floor, then rotated to L. O. A., then to O. A., the forceps handles being kept at the *right* of the mother. The second stage was completed at 7 p. m. Child's weight 10½ lb. Two small contusions on right temporal regions and one over left, caused by the spines of the ischium. Touched with tr. iodine.

In L. O. P. positions the sagittal suture lies in the left oblique diameter of the pelvis, the same as R. O. A.; accordingly it is easier in introducing the blades of the forceps to apply the *right* blade first. To make the forceps *lock*, the *right* blade will have to be *carried over the left*.

CASE VIII.—*Aet.* thirty. Para I, April, 1914. Seen in consultation. Slow labor, R. O. P., forceps rotation. Dr. — stated that the patient had been in labor two days. During the first stage she had 3 doses of morphine, ¼ gr., and atropine, 1/150 gr. After 9 p. m., April 24th, the doctor gave a hypodermic injection of pituitrin; the vertex advanced to the pelvic floor then stopped. I was sent for and arrived at 2 a. m. April 25th, patient had been arranged in the lithotomy posture on the kitchen table. Chloroform was given. The child's back was at the mother's right, fetal heart heard in the extreme right lower quadrant and also extended across the abdomen beyond the median line. Upon vaginal examination the posterior fontanelle was at the right sacroiliac synchondrosis; felt large enough to be the anterior fontanelle. The anterior fontanelle had not as yet descended far enough to be reached anteriorly. The forceps was applied to the sides of the head and it was brought *further down*, then the blades were removed and the vertex *re-examined* and the anterior fontanelle could now be felt at the mother's left. The blades were again applied and the occiput rotated to O. A. When the pains were strong, the blades were removed, but the head did not advance spontaneously, so the blades were re-applied for the third time and the vertex extracted as far as the parietal bosses, when the blades were again taken off and the head was then extracted carefully, with intact perineum.

CASE IX.—*Aet.* twenty-seven. Para II, R. O. P. Perineal tear, perineorrhaphy. Spines 25 cm., crests 28 cm., obliques 21 cm., external conjugate 21 cm. Labor commenced at midnight, March 1st, 1914. March 2nd, at 6 a. m., hard pains commenced; the membranes ruptured spontaneously at 10:30 a. m. Upon arrival at 11:30 a. m. the vertex was nearing the pelvic floor where it remained for one hour; the case at that time being under the care of Dr. —. Upon arrival, the anterior fontanelle was palpable anteriorly at the left. The kitchen table was brought into the bedroom and the patient was delivered upon it. The occiput was brought down to the vulva, and then rotated with the forceps. Perineal tear required three sutures. Child 7½ lb. Some perineums tear like parchment.

CASE X.—*Aet.* thirty-four. Para III. Pelvic measurements large, O. P., rotation to O. A., by pushing the child's back abdominally toward the median line. *Labor:* Irregular pains off and on during the day, January 7th, 1914; evening, pains every five minutes; cervix soft, two and a half finger dilatation. Kitchen table prepared and at about midnight the patient was placed upon it. Fetal heart 132; child's back was at the mother's right; position R. O. Vaginally, at this time the external os was practically dilated; occipitoparietal angle felt posteriorly. At 12:45 a. m., January 8th, the membranes were ruptured artificially; the head advanced slowly, practically stopped; occiput found to be posterior (O. P.). The child's back was now directed to be pushed over to the midline of the mother's abdomen with the idea of rotating the occiput to R. O. A.; this succeeded and the head was quickly born; there was only a small nick in the perineum. As the patient had a lacerated perineum



from her first labor, and even with this a nick occurred following the present abdominal rotation and spontaneous delivery; had rotation not have been done, the perineum at this time would doubtless have been *deeply* torn; which shows the wisdom of rotation of the occiput to the front. (While preparing this paper I have just attended this patient in her fourth labor, October 30th, 1916; the position was R. O. A.)

CASE XI.—*Aet.* thirty-six. Para VII. Consultation; April 11th, 1915, R. O. P. *Spontaneous* rotation; post-partum hemorrhage.

First stage commenced April 10th at 6 a. m.; stopped during the day. April 11th, 6 a. m., pains recommenced; at 8 a. m. patient sent for Dr. —; and at 8:15 a. m. Dr. — sent for me, as he was going out of town. Upon arrival at 9:10 a. m., pains every fifteen to twenty minutes; rather weak; fetal heart R. L. Q. 140; abdomen spherical and tense; back at the mother's right; vertex presentation; os two and a half fingers; the membranes had not ruptured, which made a good dilating wedge. At 12:15 p. m., the internal os was nearly dilated; the membranes were then ruptured artificially. Anterior fontanelle was felt high at the left; diagnosis R. O. P. While preparing for forceps rotation, strong pains brought the occiput to the pelvic floor and it commenced to rotate to R. O. T. This I assisted by grasping the head with the fingers and thumb and turned it to R. O. A. The liquor amnii, when I ruptured the membranes, was stained with meconium, but the fetal heart remained in good condition. By pushing up the head, more liquor amnii came away all stained with meconium. After the child was born there was considerable hemorrhage, and I assisted in hurrying the extraction of the placenta with the hand; it was soft and friable but came away entirely. The greater part of the hemorrhage probably came from the cervix, cervical artery, as the blood was bright arterial. A hot (116° F.) 2 per cent. acetic acid douche was given (2 oz. of an 80 per cent. acetic acid, to 3 quarts of water); and the thighs were brought down to the table, and the legs crossed over one another. This stopped the hemorrhage. This latter procedure, alone will often check hemorrhage from the cervical artery; other methods are to suture the cervix, or tampon.

CASE XII.—Para I, April, 1913. Consultation case. R. O. P., forceps rotation. Patient's weight 160-180 lb. Called by Dr. —. Patient in labor since 5 p. m., April 5th. On arrival April 6th at 4 a. m., the head was nearly on the perineum, R. O. P. The anterior fontanelle was felt anteriorly at the left. Dr. — gave chloroform. The occiput was rotated with the forceps to R. O. A., then to O. A.; the blades now having become inverted, were taken off and re-applied. After extracting the occiput as far as the biparietal eminences, the blades were again removed; and as the patient was well under the anesthetic the perineum was slowly pushed over the forehead and face; no lacerations.

CASE XIII.—Mrs. D., *æt.*, twenty. Para II, June, 1915. R. O. P., forceps rotation. Cord around neck, post-partum hemorrhage, caused by relatively short cord pulling on the placenta. Pains commenced at 2 a. m., June 17th; membranes ruptured at 3 a. m. On arrival at 5 a. m. the vertex was in mid-pelvis. *Posterior fontanelle* felt at the mother's right *posteriorly*. Patient placed on kitchen table; pains effectual; 6 a. m., *anterior fontanelle* felt at the left *anteriorly*. Diagnosis R. O. P. (fetal heart heard in right lower quadrant, 134). At 6:10 a. m. the solid blade forceps was applied; rotation; birth at 6:20 a. m. Cord around neck; passed over; light chloroform by husband. Ergotol, two doses; another in the evening. Patient at 4 p. m. voided 12 oz.; this permitted the uterus to sink and contract firmly; ordered to void every three hours until bedtime. June 18th, at 10 a. m., hemorrhage negative; pulse 60; temperature 97.6° F.; uterus firmly contracted and small. July 12th final examination; uterus normally involuted; anteflexed; slight lochia rubra.

CASE XIV.—*Aet.* twenty-four. Para II, December, 1914. L. O. P., forceps rotation. Occiput rotated to transverse; then to L. O. A.; then to O. A. when

it reached the perineum and was beginning to distend the vulva. In L. O. P. positions during rotation, the handles of the forceps are carried to the mother's right thigh.

There was no laceration; large male child; placenta Credé after a half-hour. Child in good condition, puerperium normal; patient up on the tenth day. This is an illustration of a case where the occiput was *caught (observed) on the perineum* as I entered the house, and was rotated just in time to prevent its being born as a persistent occipitoposterior. The head rotated very easily; the perineum was apparently saved from laceration, and illustrates the wisdom of performing this operation; and the *location* at which it was performed illustrates the place where in general the rotation should take place if possible.

CASE XV.—Para I, January, 1913. L. O. P., still-birth. In consultation with Dr. ——. Long labor. On arrival, position found to be L. O. P. Forceps rotation and extraction; head very much moulded. Cord twice round the neck; child born asphyxiated.

It is seen in these reports that the diagnosis of occipitoposterior positions is not always fully established in the early part of labor; and that if the vertex is engaged, or is in the pelvic cavity, the forceps may be applied and traction made whether the position of the occiput be posterior or anterior; bringing the head further down until either a posterior or an anterior position is recognized. After the anterior fontanelle is low enough to be reached anteriorly with the examining finger, the diagnosis of the occipitoposterior positions is complete. The vertex is brought still further down, to the pelvic floor, if possible, then the occiput is rotated to the anterior position. If it shows a tendency to rotate while being brought through the lower pelvis the rotation is favored. The classical location for rotation is when the occiput is about to *distend the vulva*.

The description of methods and the reports of cases are interesting and instructive; but the mastery of methods must be obtained from *observation of demonstrations* upon the manikin and the living subject. If possible a visit may be made to a medical school and hospital where facilities are offered for teaching. One would hardly be expected to do this rotation with the forceps without first seeing it demonstrated, any more than he would be advised to do a major surgical operation simply from reading a textbook on surgery. The criticisms which the subject of forceps rotation of the occiput call forth, place the method in the class of major work. But by observation and practice the method may be mastered.

To spare the child the injuries from prolonged pressure against the vertex and the mother from deep lacerations of the soft parts; to convert a protracted labor into a shorter one; to prevent exhaustion of the mother and possible sepsis from lacerations; in some cases even to make possible the advance of the head and the birth of a living child; and finally to spare the doctor the long and anxious hours of waiting, perhaps in the early hours of the morning when vitality is at its lowest—to spare, let me repeat, the child, the mother and yourself, may you become an expert after the manner outlined above, so that you may lend to the others this aid, through forceps rotation, in persistent occipitoposterior positions of the child's vertex!

## TUBERCULAR ADNEXITIS.

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Genital tuberculosis in the female must no longer be considered as a local disease, but must be looked upon as a part of a general constitutional malady.

The condition is not a rare one, as large autopsy records show that 2 per cent. of all female autopsies and 3 to 5 per cent. of all female autopsies with demonstrable tuberculosis in other organs, present a tubercular lesion involving the genitals. In fact, from 7 to 10 per cent. of all adnexal inflammatory processes are due to tuberculosis.

One period in the sexual life, its height (twenty to thirty-five years) seems to offer the greatest susceptibility to the disease.

The mode of infection in genital tuberculosis has been the source of considerable dispute, and numerous theories have been advanced to account for the apparent selective localization of the lesions.

The hematogenous route of infection is undoubtedly the most common. In carefully performed autopsies, in addition to the genital involvement, other organs, in the vast majority of cases, show a coexisting lesion of a more advanced stage. It is believed that from these old foci, an invasion of the blood-stream takes place with a consequent deposition of organisms in the genitals.

Another secondary mode of infection is by direct extension from a lesion in a neighboring structure, as the intestine, appendix, bladder or bone. In these cases one often finds, either at operation or autopsy, perforative or ulcerative lesions in these neighboring organs with adhesions to the genital structures, the more advanced lesions being in the primarily diseased organ, as the intestine, etc.

Still another method of secondary infection is by involvement through the placenta. Tuberculosis of the placenta is by no means the rarity that we have been led to believe, and careful routine examination of the placenta from tubercular women will often demonstrate lesions of tuberculosis where a rapid gross examination would miss them. The placental tuberculosis gives rise to a caseous endometritis, and from this, either by direct extension through the lumen of the tube or by lymphatic progression, an adnexal tuberculosis may develop.

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A further possibility of secondary involvement is by extension of the tuberculosis from the peritoneum to the genitalia. This method cannot be frequent when one considers the large number of cases of peritoneal tuberculosis and the rarity with which that condition is complicated by a true genital tuberculosis. Of course, the pelvic peritoneum, visceral and parietal, may take part in a general peritoneal tuberculosis, but the real involvement of tubal or uterine mucosa or myometrium is uncommon, and when it does occur it can usually be readily accounted for as a secondary process, a hematogenous infection. It seems much more likely that in the cases of peritoneal and genital tuberculosis the peritoneum becomes infected by material from the diseased tubal lumen.

Primary tuberculosis of the tubes is still a much mooted question, and many authors absolutely deny the occurrence of an ascending infection. An absolutely impeachable case of an ascending infection has not as yet been described. Animal experimentation has shown that the non-motile tubercle bacillus can advance slightly against the force of the secretions, but even these observations have been adversely criticized.

Occasionally a vaginal or cervical tuberculosis may follow a placental tuberculosis, but a primary vaginal or cervical tuberculosis following coitus, masturbation or instrumentation is very unlikely.

The organ most commonly affected is the tube. This, as has been previously pointed out, is almost invariably a hematogenous infection with the primary lesion in the lungs or lymph-nodes. The pathological lesions show marked variations. It occurs in two main forms, the miliary and the cheesy. Aside from those cases of miliary involvement of the tubal peritoneum in which instances we are dealing either with a part of a general miliary tuberculosis or of a general peritoneal tuberculosis, the miliary form first attacks the mucosa. Typical epithelioid tubercles are found isolated or in small groups in the mucosal folds. Later the tubercles become confluent, and the myometrium and finally the peritoneum are involved. On the surface there are isolated or agminated miliary tubercles and rarely small caseous areas. As the condition advances, there is complete destruction of the mucosa and an accumulation of cheesy debris in the lumen. The wall becomes thickened, convoluted, adherent to the surrounding structures; the fimbriated extremity, however, usually remains patent even in advanced cases. The condition does not always tend to progress, and an important factor in the treatment can be mentioned here—namely, the tendency to spontaneous healing which under hygienic conditions may take place. This healing process results in a fibrosis or calcification of the tube and is often described as the fibroid type of tuberculosis.

In the cheesy form we have a more advanced condition than that previously described. Here the abdominal ostium is closed and the entire tube is converted into a sac, which is filled with cheesy se-

cretion. The wall is destroyed and the mucosa only represented by small islands of tissue. The lining is furry, thick and yellowish, studded with caseous areas and occasionally miliary tubercles. The tube is adherent to all the surrounding structures, especially the ovary, which is also often involved. Occasionally a rupture into a neighboring viscus may take place. Depending on the duration of the condition the contents may vary from a thin, cheesy material to a thick putty-like substance. Tubercle bacilli can be found in the contents, though not in very great numbers. Often when there is communication with or damage to the intestine, a secondary infection of the sac by colon bacilli or streptococci may take place, and the sac may then contain virulent pus. These cases form a most dangerous type from an operative point of view.

The ovary becomes diseased relatively rarely in comparison with the tubes; however, numerous instances have undoubtedly been overlooked because of the difficulty of diagnosis except in the advanced cases. The ovary is often involved with the tube when this latter structure presents an advanced lesion. It may be attacked as part of a general miliary tuberculosis or infected by the blood or lymph stream from a distant focus. It is most commonly involved by an extension process from the tubes or uterus and rarely from the peritoneum, intestine or appendix. As a rule, both ovaries are involved. The lesion may be simple miliary tuberculosis of the surface, with adhesions, really a peri-öophoritis, or a real invasion of the parenchyma of the organ with typical epithelioid tubercles. In more advanced types there is a caseous lesion, or solitary or multiple abscesses. In the caseous type the process arises by the confluence of miliary tubercles with cheesy degeneration of the tissue, which later may liquefy and form sterile pus in solitary or multiple sacs, and so develop into the abscess form. As in the tube, the contact with the hollow viscera of the pelvis or abdomen may lead to a secondary infection with pyogenic organisms and the production of virulent pus. Often when the tube and ovary become matted together and there is formed a communication between the two, by the rupture of either the pus tube or the ovarian abscess, and we have the condition known as tubo-ovarian abscess of tubercular nature.

When the adnexa are thus involved the entire pelvis may be filled with firm adhesions and often with a hard fibrinous exudate, binding the genitals tightly to the pelvic viscera and walls. It is just in this type that operation is exceptionally dangerous.

Strictly speaking the title of the paper does not include the question of uterine tuberculosis, but for a proper appreciation of the treatment of the diseased adnexa, it must be discussed.

It is much more frequent than is commonly supposed, but practically always associated with tubal disease. The uterus is usually infected by a descending process from the tubal lumen or by hematogenous implantation. The question of placental tuber-

culosis giving rise to a tubercular endometritis has already been fully discussed.

The disease here appears either as a miliary tuberculosis of the endometrium or as a cheesy form due to the agmination of the tubercles with caseation and breaking down of tissue. The myometrium also may be similarly involved and the lesion may even penetrate to the serosa. With the caseous type the entire uterine cavity becomes filled with cheesy masses and the organ becomes enlarged and soft. The process usually confines itself to the body, but occasionally the cervix is involved either by an ulcerative condition with tiny tubercles around the margins of the ulcer, or a more cauliflower-like mass with a breaking down, friable, bleeding surface.

The symptomatology of pelvic tuberculosis presents nothing characteristic. The subjective complaints are much the same as those of any chronic pelvic inflammation. The chief complaint is lower abdominal pain, more or less constant and aggravated by exercise. There is often no antecedent uterine or cervical inflammation, especially in young women. Almost all the cases complain of sterility, in fact in two of the cases studied, the only complaint was sterility, one of the women having had two unsuccessful operations for the cure of this condition. Occasionally there are some menstrual disturbances; in many instances, the menses are scanty and irregular, in others profuse and painful. Some of the patients complain of fever or chilly sensations and some, having lesions in other organs, have symptoms referable to these organs as cough, expectoration, etc.

The diagnosis of pelvic tuberculosis is at times extremely difficult and often it is only at the operating table that a diagnosis is made. In a number of cases the diagnosis before operation is possible and in not a few comparatively easy. Chronic tubal disease in a virgin with no etiology is tubercular in 90 per cent. of the cases. In patients with pelvic disease of a chronic nature and pronounced evidence of tuberculosis in other organs, as the lungs, lymph-nodes, intestine, peritoneum, bones or joints, it can be said with tolerable certainty that the coexisting pelvic disease is also of tubercular nature. Another point that arouses suspicion is the presence of a chronic pelvic inflammation of unknown origin that in spite of all treatment does not improve even temporarily. There are, of course, other symptoms or physical signs which will also help to suggest the diagnosis, as for instance, a pelvic inflammatory disease of a chronic nature associated with ascites is commonly tubercular in origin. It happens, though rarely, that a patient, who has entered the hospital because of irregular menses or fluor and has been curetted, has a uterine tuberculosis entirely unsuspected and only revealed by the curette. While the curettage is not a harmless procedure, it may often, when gently and carefully done, thus make



the diagnosis in an obscure case. Finally, the use of tuberculin as a diagnostic measure also occasionally helps.

When we come to the question of treatment we are confronted with a difficult problem. Genital tuberculosis *per se* does not cause death. Rarely it may result in a perforation into some other viscus and thus lead to a fatal termination. It is usually only a part of a constitutional disease, and in most instances of pelvic tuberculosis, the fatal issue is determined by the general process or the involvement of some important organ. Another mode of death is from post-operative peritonitis or fistula formation. In fact, these latter two conditions are very common. While the condition in the pelvis is progressive in nature, we must realize that often the disease retrogresses and results in a completely healed local process. In fact, there have been described fibroid types of genital tuberculosis which really represent healed lesions.

What shall we do when we have made the diagnosis? The problem is not easy. We must realize that we are called upon to decide the question of treatment under two entirely different conditions, one before operation and the other when the abdomen has already been opened and the diagnosis only then revealed.

Let us treat with the first of the above-mentioned contingencies. If the genital disease is only one part of a marked general process, nothing operative should be attempted. The usual general hygienic care should be instituted and only those local measures used as indicated for the relief of special symptoms. As I have stated before, genital tuberculosis shows a kindly tendency to heal spontaneously. Any operative interference, unless urgently indicated, is dangerous, for it is well known that already existing tuberculosis, as in the lungs, easily undergoes marked aggravation through operative interference. In the presence of a progressing pulmonary lesion, operation is absolutely contraindicated except if urgently indicated for the safety of the patient.

In those instances, where there are no other manifest tuberculous foci, the problem is slightly different. Here we must take into consideration that hygienic treatment often results in a cure of the local condition. This is the ideal treatment when the lesion is not very advanced and the symptoms only moderately annoying. Of course, the social and pecuniary position of the patient must be considered, and in the vast majority of hospital patients purely hygienic treatment is not practical. When the hygienic treatment cannot be carried out, either because of the social position of the patient, or because the symptoms demand attention, the operative treatment varies.

In young women with early lesions of the tubes simple extirpation followed by a more hygienic mode of life is the procedure of choice. In older women, while a conservative operation is successful, removal of all the internal genitals gives a better result, as in these

the menopausal symptoms are not so severe and all the offending organs are removed. Following incomplete operations there is always a tendency to the formation of pelvic exudates. Improvement in general hygiene must always be insisted on. In the more advanced lesions of tubes, uterus, ovaries or all three with not too extensive adhesions or exudate, a radical extirpation with the usual hygienic regimen often offers the best mode of treatment at all ages.

Again there are a number of cases in which operative interference is indicated because of the danger from the local condition, as in the case of large pyosalpingses with mixed infection. Here, if possible, drainage of the abscesses and hygienic measures should be instituted, or if a radical procedure is feasible without too great a risk, it should be done; by that is meant a complete hysterectomy with removal of both adnexa.

Finally in those cases of dry tuberculosis with adhesions to intestine and with the pelvis filled with hard exudate, all operative interference is contraindicated. If, however, the second contingency arises—namely, that the abdomen has been opened under a mistaken diagnosis, only such palliative measures should be attempted as are necessary, as drainage of encysted abscesses, etc. Such cases when operated on, especially if anything radical is done, give a very doubtful prognosis, as the tendency to permanent fistulæ of either bladder or intestine is great, and these patients perish in a short time either from peritonitis or exhaustion. These women may under proper hygienic control improve sufficiently to permit operative interference at a later day. Cases of mild involvement that have been laparotomized under a mistaken diagnosis, should be treated conservatively, whereas more advanced cases can be dealt with as already outlined above.

It seems only proper to mention that post-operative complications in cases of pelvic tuberculosis are not uncommon. The breaking down of the abdominal wound occurs quite frequently in spite of all precautions. Fistulæ develop in the more advanced cases notwithstanding the greatest care to avoid injury to the hollow viscera. Old smouldering tubercular foci that have been overlooked or disregarded because of the urgency of the local condition, are lighted up, and finally in those cases of mixed infection a virulent peritonitis may follow and result fatally. It must be remembered that an operation badly chosen often results in the death of the patient.

The following is a brief summary of the cases from the gynecological services of Dr. Brettauer and Dr. Vineberg, which were studied.

CASE I.—F. T., æt. thirty-three. Menstruation normal. Married eleven years. Sterile. *Chief Complaint:* Abdominal pain for nine years. Dysuria and rectal tenesmus. *Pathological Findings:* Tubercular salpingo-öophoritis bilateral. *Operation:* Complete hysterectomy. Patient developed a fecal fistula which healed spontaneously. Discharged well in four and a half weeks.

CASE II.—B. H., *æt.* twenty-eight. Menstruation irregular, painful. Married ten years. Sterile. *Chief Complaint:* Abdominal pain for three years, dysmenorrhea. *Pathological Findings:* Bilateral tubercular salpingo-öphoritis. Ovaries cystic. *Operation:* Complete hysterectomy. Discharged well in four weeks.

CASE III.—J. R., *æt.* twenty. Menstruation normal. Married three years, one child, one miscarriage. *Chief Complaint:* Left abdominal pain for one week, fever, chilly sensations and fluor. *Pathological Findings:* Bilateral tubercular salpingo-öphoritis. *Operation:* Bilateral salpingo-öphoritis. Discharged well in seven weeks. Developed small exudate.

CASE IV.—E. B., *æt.* twenty-nine. Menstruation profuse every two to three weeks. Married six years, sterile. *Chief Complaint:* Two months backache and metrorrhagia. *Pathological Findings:* Right tubercular pyosalpinx, left hydrosalpinx, tubercular endometritis. *Operation:* Curettage, left salpingectomy, right salpingo-öphorectomy. Discharged well in three weeks.

CASE V.—S. N., *æt.* twenty-two. Menstruation irregular every three to seven weeks, scanty. Married two years, sterile. *Chief Complaint:* Persistent fecal fistula following post-vaginal section for pelvic abscess one year ago. *Pathological Findings:* Bilateral tubercular salpingitis and perisalpingitis with large exudate. *Operation:* Bilateral salpingectomy followed by a fecal fistula. Finally discharged well in five weeks.

CASE VI.—B. W., *æt.* thirty-six. Menstruation normal. Married sixteen years, four children. *Chief Complaint:* Abdominal pain for three months. *Pathological Findings:* Right tubercular salpingitis and öphoritis (cystic), left tubercular salpingitis. Pelvis filled with fine adhesions. *Operation:* Right salpingo-öphorectomy, left salpingectomy. Discharged well in four and a half weeks.

CASE VII.—A. H., *æt.* twenty-six. Menstruation normal. Married eight years, sterile. *Chief Complaint:* Admitted twice. The first time complained of abdominal pain for three months. *Pathological Findings:* Pelvic abscess. *Operation:* Post-vaginal section. Discharged improved with pelvic exudate in four weeks. On second admission complained of persistence of symptoms. *Pathological Findings:* Right tube sealed and distended, covered with tubercles. *Operation:* Right partial salpingectomy. Discharged in three and a half weeks improved. Still has some pelvic exudate.

CASE VIII.—A. B., *æt.* twenty-three. Menstruation profuse. Married two years, sterile. *Chief Complaint:* Femoral protrusion, slight cough and menorrhagia. *Pathological Findings:* Right tubercular salpingo-öphoritis. Left tubercular salpingitis. *Operation:* Right salpingo-öphorectomy. Discharged improved with slight exudate, in three and a half weeks.

CASE IX.—M. B., *æt.* twenty-four. Menstruation normal. Married five years, sterile. *Chief Complaint:* One month abdominal pain and slight spotting. *Pathological Findings:* Right tubo-ovarian abscess tubercular, left tubercular salpingo-öphoritis. *Operation:* Right salpingo-öphorectomy, left salpingectomy and partial öphorectomy. Patient developed a post-operative pelvic abscess requiring a post-vaginal section. Discharged improved with slight pelvic exudate, in nine weeks.

CASE X.—B. H., *æt.* twenty-nine. Menstruation scanty. Married eight years, sterile. *Chief Complaint:* Abdominal pain for two years. *Pathological Findings:* Left tubercular salpingo-öphoritis. *Operation:* Left salpingo-öphorectomy. Discharged well in four weeks.

CASE XI.—R. F., *æt.* twenty-three. Menstruation scanty. Married four years, sterile. *Chief Complaint:* Abdominal pain for three months. *Pathological Findings:* Left tubo-ovarian abscess tubercular, right tubercular salpingitis. *Operation:* Left salpingo-öphorectomy, right salpingectomy. Discharged well in four weeks.



CASE XII.—P. F., *æt.* thirty. Menstruation normal. Married ten years, sterile. *Chief Complaint:* Backache for two years. *Pathological Findings:* Bilateral tubercular pyosalpinx. *Operation:* Bilateral salpingo-öophorectomy. Discharged well in eight weeks.

CASE XIII.—L. G., *æt.* twenty-five. Menstruation normal. Married six years, sterile. *Chief Complaint:* Sterility. *Pathological Findings:* Right tubercular salpingo-öophoritis, left salpingitis. Discharged well in five weeks. *Operation:* Right salpingo-öophorectomy, left salpingectomy.

CASE XIV.—M. M., *æt.* twenty-five. Menstruation profuse. Married six years, sterile. *Chief Complaint:* Backache for two months and metrorrhagia. *Pathological Findings:* Bilateral tubercular salpingo-öophoritis. *Operation:* Bilateral salpingo-öophorectomy. Discharged well in six weeks.

CASE XV.—A. F., *æt.* twenty. Menstruation normal. Married two years, sterile. *Chief Complaint:* Right iliac pain for three months. *Pathological Findings:* Bilateral tubo-ovarian abscess tubercular, slight pulmonary tuberculosis. *Operation:* Bilateral salpingo-öophorectomy. Developed a pleurisy, post-operative. Discharged improved with small exudate, in six weeks.

CASE XVI.—R. P., *æt.* twenty-three. Menstruation normal. Married three years, sterile. *Chief Complaint:* Abdominal pain for nineteen months. Has pulmonary tuberculosis. *Pathological Findings:* Tubercular pyosalpinx and tubo-ovarian abscess. *Operation:* 1" post-vaginal section nine months ago; 2" post-vaginal section three months ago; 3" left salpingo-öophorectomy. The abdominal wound broke down. Patient was discharged improved with pelvic exudate, in ten weeks.

CASE XVII.—E. M., *æt.* thirty-two. Menstruation scanty. Married eight years, sterile. *Chief Complaint:* Abdominal pain for three months. Vaginal discharge. *Pathological Findings:* Bilateral tubo-ovarian abscess tubercular. *Operation:* Bilateral salpingo-öophorectomy. Discharged improved in three and a half weeks.

CASE XVIII.—R. H., *æt.* thirty-five. Menstruation scanty. Single. *Chief Complaint:* Backache for three years. *Pathological Findings:* Bilateral salpingitis nodosa tubercular. *Operation:* Bilateral salpingectomy. Abdominal wound broke down. Discharged improved with sinus in abdominal wall and small exudate, in four and a half weeks.

CASE XIX.—M. S., *æt.* thirty-four. Menstruation normal. Married nine years, sterile. *Chief Complaint:* Three days abdominal pain, vomiting and fever. *Pathological Findings:* Miliary tubercular salpingo-öophoritis with involvement of omentum and peritoneum. *Operation:* Bilateral salpingo-öophorectomy, partial resection of omentum. Discharged well in five weeks.

CASE XX.—M. C., *æt.* twenty-five. Menstruation profuse. Married six years, sterile. *Chief Complaint:* Six months abdominal pain and slight metrorrhagia. *Pathological Findings:* Bilateral tubercular salpingitis and peritoneal tuberculosis. *Operation:* Bilateral salpingo-öophorectomy. Wound broke down. Discharged improved in five weeks.

CASE XXI.—A. H., *æt.* twenty-four. Menstruation scanty. Married four years, sterile. *Chief Complaint:* Six months abdominal pain and loss of weight. *Pathological Findings:* Left tubo-ovarian abscess tubercular, right tubercular salpingitis with vaginal drainage. Developed urinary fistula which healed. Discharged improved in six months.

CASE XXII.—B. K., *æt.* twenty-eight. Menstruation normal. Married eleven years, sterile. *Chief Complaint:* Sterility and two years abdominal pain. *Pathological Findings:* Left tubo-ovarian abscess tubercular. *Operation:* 1910, post-vaginal section for abscess; 1911, left salpingo-öophorectomy for abscess; 1912, post-vaginal section and abdominal section and drainage. Discharged improved in four and a half months.

CASE XXIII.—J. A., *æt.* twenty-three. Menstruation normal. Married four years, sterile. *Chief Complaint:* Sterility. *Pathological Findings:* Left tubo-ovarian abscess tubercular, right hydrosalpinx. *Operation:* Left

salpingo-öophorectomy, right salpingectomy and partial öophorectomy. Discharged improved in four weeks.

CASE XXIV.—S. R., *æt.* forty-five. Menstruation profuse. Married twenty-four years, sterile. *Chief Complaint:* Eight years abdominal tumor, spotting for two weeks. *Pathological Findings:* Fibroids. Tuberculosis of tube and peritoneum. *Operation:* Complete hysterectomy. Discharged well in three weeks.

CASE XXV.—M. S., *æt.* thirty-nine. Menstruation normal. Married fourteen years, sterile. *Chief Complaint:* Eight years complained of sterility, backache and dyspareunia. At that time *pathological findings* showed bilateral tubercular salpingitis and small fibroid. *Operation:* Bilateral salpingectomy and myomectomy. Discharged well in three and a half weeks. Operated two years ago for fibroid. Hysterectomy followed by fecal fistula. Returned now for operation to repair fecal fistula. Laparotomy showed no evidence of tuberculosis. Extensive pelvic adhesions and cystic ovaries.

CASE XXVI.—I. P., *æt.* twenty-seven. Menstruation scanty. Married five years, one child. Eight years ago had tubercular arthritis. *Chief Complaint:* Abdominal swelling for seven weeks, fever, sweats and cough. *Pathological Findings:* Ascites. Pulmonary tuberculosis, left tubercular salpingo-öophoritis and tubercular peritonitis. *Operation:* Abdominal paracentesis, reaccumulation of fluid, left salpingo-öophorectomy. Wound suppurated. Died of purulent peritonitis in one and a half weeks.

CASE XXVII.—J. L., *æt.* twenty. Menstruation scanty. Married four months, sterile. Three weeks right-sided abdominal pain and vaginal discharge. *Pathological Findings:* Bilateral tubercular salpingo-öophoritis with extensive exudate and acute gonorrheal urethritis. *Operation:* Right inguinal incision and drainage. Developed fecal fistula. Old pulmonary focus lighted up and made rapid progress. Finally died after five and a half months and autopsy showed also a general miliary tuberculosis.

CASE XXVIII.—D. S., *æt.* twenty-two. Menstruation profuse. Single. *Chief Complaint:* Seven months abdominal pain. Dysmenorrhea. Vaginal discharge, fever. *Pathological Findings:* Left tubercular tubo-ovarian abscess and right tubercular salpingo-öophoritis with numerous adhesions and exudate. *Operation:* Complete hysterectomy and vaginal drainage. Large exudate persisted. Abdominal wound suppurated. Abdominal fecal fistula. Progressive emaciation. Death in nine and a half months.

An analysis of these 28 cases presents many interesting facts. With the exception of 2 cases all the patients ranged in age from twenty to thirty-five years. One was thirty-six and the other forty-five; the latter case did not present a very advanced type of lesion, in fact it was an accidental find in the course of a laparotomy for fibroids.

Menstruation was normal in 46 per cent. of the cases, scanty in 32 per cent. and profuse in 22 per cent. In several of the instances there were complaints of slight irregularities in time. All but 2 of the patients were married and in 85 per cent. of the cases one of the main complaints was sterility, though many were married more than five years. The symptoms offered nothing unusual, pain being the most constant symptom. One case returned to the hospital after a post-vaginal section because of the persistence of the symptoms and a discharging sinus, and two patients complained solely of sterility.

The lesions found varied widely, but in the large majority of cases it was either a tubo-ovarian abscess or a tubercular salpingo-

öophoritis. In the treatment, conservatism was aimed at; in some instances there were brilliant results, while in others it would seem that a more radical procedure would have given a better result. Of the 28 cases 12 were discharged improved, by which was meant a general improvement but with some pelvic exudate present; in 10 of these cases there was an incomplete operation, either a partial resection of tube or ovary on one or both sides, or a unilateral salpingo-öophorectomy. In one case with peritoneal tuberculosis and an advanced genital lesion involving both tubes and ovaries, the uterus was left, and in one other a complicating pulmonary lesion probably interfered with the proper healing. In one case, eight years after bilateral salpingectomy for tubal tuberculosis, the abdomen was reopened, and while no evidence of tuberculosis was found, an extensive adhesive, pelvic peritonitis was present. The operative results were not particularly encouraging. Of the 28 cases, 13 were discharged well but were not subsequently traced; 12 were discharged improved, and though undoubtedly the pelvic condition was helped, in all probability the residual exudate would give rise to further trouble. In three instances operation was followed by exitus.

Of the 3 cases that died 2 cases had pulmonary tuberculosis. One of these two also gave the history of a tubercular arthritis, while the third case had an extensive pelvic lesion.

The complications, while not numerous, were varied. In 4 cases there were fecal fistulæ all in rather advanced cases. There was one case of urinary fistula also in an advanced case. Two of the intestinal fistulæ healed spontaneously and the urinary fistula also. In 2 of the other cases the fistulæ persisted up to the time of exitus.

In 5 cases the abdominal wound broke down and in 3 the patients were discharged with persistent sinuses. One of the cases died of peritonitis and in the fifth, death followed exhaustion and tubercular enteritis, the wound never healing. One case of peritonitis developed which led to a fatal termination.

One final interesting fact was the duration of the hospital stay. None of the cases was in the hospital less than three weeks. The average duration was about six weeks. Several of them were in from eight to ten weeks, 2 who were finally discharged improved in four and a half and six months respectively. In 2 of the fatal cases one was bed-ridden in the hospital for five and a half months, the other for nine and a half months. It was in those cases of bilateral tubo-ovarian disease with conservation of the uterus and the subsequent development of pelvic exudates that the stay was most prolonged. In fact many of the cases were discharged as improved with persistent exudates and sent to the country for rest and building up.

I wish to thank Dr. F. S. Mandlebaum, director of the laboratory, for permission to study the pathological material and also Drs. Brettauer and Vineberg for the use of the clinical data.



## SOME PROBLEMS IN THE USE OF NITROUS OXIDE AND OXYGEN IN SURGERY AND OBSTETRICS.

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Seven years before Fulton built the first successful steamboat Sir Humphrey Davy discovered the anesthetic properties of nitrous oxide. He describes his experience as follows: "The power of the immediate operation of the gas in removing intense physical pain, I had an opportunity of ascertaining. In cutting one of the unlucky teeth called *dentes sapientiæ*, I experienced an extensive inflammation of the gum, accompanied with great pain, which equally destroyed the power of repose and of consistent action. On the day when the inflammation was the most troublesome I breathed three large doses of nitrous oxide. The pain always diminished after the first four or five inspirations, the thrilling came on as usual, and uneasiness was for a few minutes swallowed up in pleasure. As the former state of mind, however, returned the state of organ returned with it; and I once imagined that the pain was more severe after the experiment than before." (Chemical and Philosophical Experiments, p. 464.) From this statement it appears that he was the first to use nitrous oxide analgesia. But it seems probable that this anesthetic was not employed in the practice of a physician or dentist until Horace Wells, of Hartford, Connecticut, in 1844, inhaled it during a tooth extraction.

After the death of Wells in 1848, nitrous oxide was developed in this country by the Colton Dental Association of Philadelphia. Guilford states that until 1887 the members of this association had administered gas 147,000 times without a fatality. In other papers I have stated that Edmund Andrews was the first to use oxygen with nitrous oxide; but in his original article, published in 1868, he says: "Dr. Rogers, a dentist of this city, states that he has used a mixture containing one-third free oxygen for several years, and that in his opinion it is far pleasanter than unmixed nitrous oxide." Nevertheless, Andrews was the first to conduct experiments showing the importance of giving a patient oxygen with gas. Of these he says: "The above experiments are by no means sufficient to settle the value of the oxygen mixture, but they give strong reason to think that it will prove the safest and by far the pleasantest anesthetic known. As to safety, it is highly significant, that a rat

which had been twice immersed in the mixture for half an hour without injury, was killed in two minutes by ether; and yet ether is far safer than chloroform." In 1878, Paul Bert conducted exhaustive experiments which confirmed the work of Andrews. Stimulated by the work of Bert, Klikowitsch and later Winckel, working with extremely crude apparatus, showed the value of the nitrous oxide-oxygen analgesia in normal labor. Edgar first recorded these results in English, when in 1890 he published a translation of Winckel's "Text-Book of Midwifery." But while this anesthetic was being used rather extensively in dentistry and in some hospitals for examinations and minor surgery, it was practically abandoned in obstetrics until Dr. J. Clarence Webster in the winter of 1904 commenced using it as a substitute for ether and chloroform in operative obstetrics. Teter used it on a member of his family in 1905.

The early manufacture of nitrous oxide was in the hands of the apothecary. Winckel says: "It seems to me most practical to get the mixture from the apothecary, as was formerly the case, and that he should be provided with rubber bags, which he may fill and furnish the physician when needed." Dentists later began to prepare their own gas and store it in manometers. According to Andrews, Evans, an American dentist in Paris, was possibly the first to have his gas compressed into a liquid in metal cylinders. He had done this prior to 1868. He found that this liquid gas was purer and only about half the usual amount of the anesthetic was required to anesthetise a patient. Warner of the Lakeside Hospital, Cleveland, has more recently found that much of the nitrous oxide they prepared contained basic impurities which, while possibly of little danger in short anesthetics, were a real source of danger when gas was administered for longer periods. Storing the gas in metal cylinders removes the nitric oxide, but some other impurities remained. By washing the nitrous oxide with strong sulphuric acid the gas is purified and made practically non-toxic. This acid wash has been added recently to the older methods of purification, by most of the manufacturers of nitrous oxide.

#### MORTALITY FROM NITROUS OXIDE-OXYGEN ANESTHESIA.

Baldwin in a recent article makes the alarming statement that nitrous oxide-oxygen is the most dangerous anesthetic. This assertion is unfortunate if not based on facts; if true it should be published broadcast. All agree that there is no anesthetic entirely free of danger. But what is an anesthetic death? Were Baldwin's cases anesthetic deaths? For example, Case XIV: "Mr. L., *et. sixty-two*, was brought to the hospital May 14th, 1912, with a diagnosis of peritonitis from appendicitis. His condition when he reached the hospital was bad, as he had got chilled on the train

coming up. In the course of an hour this condition improved, so that he had a good color, and a good heart's action. His condition was such as to indicate extensive infection, and I planned to make a quick incision and put in a drain. For this purpose I thought nitrous oxide-oxygen safer than ether. He took it nicely, but as the incision was being made he died suddenly. After death was determined the incision was extended somewhat, and it was then found that there had been a plugging of the superior mesenteric artery, all the intestines supplied by the artery being black and devitalized. Of course, death would have occurred within a few days, *so that the anesthetic death was of no special importance.* Within a few months of this time, however, I had two similar cases, one in a young woman of about thirty, the other in a man about sixty. Ether was given in both cases, the abdomen opened, the condition determined, and the abdomen at once closed. Both survived the operation by a day or two."

Last winter Dr. Culbertson had in the County Hospital a colored woman with bleeding fibroids and a broken compensation of the heart. After keeping her at rest in bed for several weeks, he decided that her condition was as good as could be expected and had her posted for operation. Owing to the gravity of her condition he had planned to operate with the combined gas and local. She died of a pulmonary embolus just before they were ready to take her to the operating room. Had this occurred after starting the anesthetic, would it have been an anesthetic death?

More recently Dr. Bassoe had one of our internes give a light anesthetic to an overgrown eighteen-year-old boy, while he did a spinal puncture. Death occurred without any warning just after the completion of the puncture. There was no asphyxiation. Dr. Raulston who performed the autopsy, states that he found a marked hyperplasia of the lymphatic tissues or the condition usually referred to as 'status lymphaticus.' After hardening the brain Dr. Bassoe sectioned it and found a cystic tumor in the region of the pineal gland. Both Dr. Bassoe and Dr. Raulston agree that this death was not due to the use of the nitrous oxide.

Since we have been giving nitrous oxide-oxygen analgesia in the Maternity of the Presbyterian Hospital, one baby has been born dead. The mother was admitted to the Maternity thirty minutes before delivery, and had gas less than twenty minutes and just during contractions. The fetal heart tone could not be heard on admission and she had not felt fetal movements since the previous day. Four babies have died shortly after birth. In one, the autopsy showed a large foramen ovale, and in three the ductus arteriosus was much larger than the pulmonary artery and could not close. Neither nitrous oxide or pituitrin was responsible for any of these deaths. However, when we formerly used large doses of pituitrin,



four babies did die within a few weeks in which the autopsy failed to show any cause for death.

In 1870, Edmund Andrews, in a laborious collection of statistics covering over 200,000 cases, found the mortality of the anesthetic agents in use at that time as follows: "Chloroform, one death in 2,723 cases; sulphuric ether, one death in 23,204 cases; mixed chloroform and ether, one death in about 7,000 cases; nitrous oxide, no deaths in 75,000 cases." Is it possible, even so early in the use of the various anesthetising agents, that surgeons and anesthetists were trying to hide deaths resulting from the use of nitrous oxide, or has its administration with oxygen by skilled anesthetists using more complicated machines made it more dangerous than it was with the crude apparatus of 1870?

At the Presbyterian Hospital it has for some years been our custom on the Gynecological Service to give nitrous oxide-oxygen anesthesia for the very serious cases where we thought the anesthetic of extreme danger. We have not had a death which could in any way be attributed to its use, and we all believe that it has been the means of saving many lives. I know of a few cases which stopped breathing and required slight artificial respiration, but I have seen this happen more frequently when ether was the anesthetic.

#### PRE-MEDICATION AND ANESTHETICS.

The only drug ever administered preliminary to our surgical anesthetics is atropine sulphate gr. 1/100 to 1/60. The use of atropine lessens the amount of mucus in the patient's throat, thus favoring a clear respiration, and through its inhibitory effect on the vagus acts as a circulatory stimulant. The use of morphine or morphine and scopolamine is rarely if ever advisable, and we consider it a source of some danger. Dr. B. F. Davis, who has given this subject much careful study, says: "Morphine alone, preceding local anesthesia, adds nothing to the efficiency of the anesthetic, and causes post-operative nausea and vomiting in 25 per cent. of the patients; it makes the patient 'dopey' and hence deprives the operator of the cooperation of the patient, which at times may be valuable." On the Gynecological Service morphine has never been necessary to the success of a local anesthetic, and if it is not needed with a local, certainly it is not needed for a general anesthetic.

#### CONTRAINDICATIONS TO THE USE OF NITROUS OXIDE-OXYGEN.

Nitrous oxide and oxygen, combined in the proper proportions, and skillfully administered in suitable cases, is undoubtedly the most desirable and safest of general anesthetics. But since this anesthetic has its limitations and contraindications, the exceptions to its use are of considerable importance. Sajous gives the contraindications as follow:—

"Circulatory abnormalities constitute the most frequent contra-

indications to nitrous oxide, which is to be avoided both in well-marked atheroma, especially if a high blood-pressure coexists, and in cardiac dilatation, with or without a valvular lesion. Mitral stenosis, aortic regurgitation, and the 'beer heart' are generally held to contraindicate nitrous oxide, as does also the combination of high blood-pressure with a weak cardiac first sound. Buxton regards the anemic individual, the 'overgrown' boy; the nervous, sensitive child subject to fainting; the child with congenital cyanosis, and the person with a hypertrophied heart as among the most dangerous types of individuals for nitrous oxide, syncope and asphyxia easily occurring in these cases. With care to obviate struggling and undue exclusion of air or oxygen, however, no absolute contraindication to gas anesthesia is presented even in these cases.

"Marked respiratory embarrassment, especially if due to a swelling which will be made worse through venous congestion, contraindicates nitrous oxide anesthesia, but if the dyspnea be of minor extent, as is frequently the case in patients with tonsillar swellings, Ludwig's angina, glandular or other enlargements exerting pressure on the respiratory channels, enlarged thymus, large adenoid growths, intra-abdominal effusions or growths pressing on the diaphragm and heart, obesity, pleural adhesions, and general affections causing dyspnea, nitrous oxide may be used provided great care is taken to avoid all asphyxia during the anesthesia.

"In the aged, intolerance of asphyxia and circulatory stress is likewise a feature to be remembered, especially if chronic bronchitis is present; nitrous oxide is not, however, contraindicated by old age *per se*. In pregnant women it should be borne in mind that excessive exclusion of air may injure the fetus or bring on labor, while in children marked jactitations result from similar carelessness in the use of the anesthetic."

From a considerable experience both in administering and in operating with nitrous oxide-oxygen anesthesia, I would urge that this anesthetic be discontinued in favor of ether whenever it becomes evident that anesthesia cannot be maintained without causing cyanosis. "Every individual is a cosmos in himself and demands a painstaking selection and modification of the anesthetic means particularly suitable to his, and only his, case. Personal, physical, emotional, traditional, environmental, racial, climatic and many other factors and their particular mixture in each patient determine the selection of the anesthetic method of choice or its modification to meet individual requirements" (R. H. Riethmüller).

#### INDICATIONS FOR NITROUS OXIDE-OXYGEN ANESTHESIA.

Dr. Bevan in discussing the choice of an anesthetic limits nitrous oxide in the following ways:—

"1. Safety: Gas for short anesthetics, such as pulling teeth,

opening abscesses, etc., is the safest anesthetic known. In prolonged anesthetics, a half hour or more, gas is now known to be more dangerous than ether. I refer now to the use of gas and ether in the hands of experts. In the non-expert hands, gas in prolonged anesthetics is much more dangerous than ether.

"2. Comfort: Gas is the most agreeable inhalation anesthetic.

"3. Gas is not an efficient anesthetic, such as chloroform or ether. Complete anesthesia and complete relaxation for prolonged periods are difficult to maintain, and are not possible in a considerable percentage of cases.

"4. Control: Gas can be stopped at danger signals, and the agent already in the system is eliminated more rapidly than any other agent.

"5. Simplicity: The apparatus for giving gas is not very complicated, more so, however, than that used in giving ether and chloroform. It is not so widely adaptable as ether. The apparatus is heavy and cumbersome, and somewhat difficult to transport. This difficulty can usually be overcome.

"6. After-effects on blood, tissues and viscera, practically negative.

"7. Vomiting occurs in but a small percentage of cases.

"8. It has little or no effect on immunity.

"Conclusions: Gas should be one of the general anesthetics employed in the surgical clinic. Its place should be for short anesthetics in which unconsciousness is desired and local anesthesia not applicable—in reducing fractures and dislocations, opening abscesses, and in some more prolonged operations in which for special reasons gas becomes safer than ether, such as operations on the urinary tract with kidney insufficiency. A surgical clinic which does not employ gas anesthesia is, from the standpoint of anesthetics, a poorly conducted clinic."

The indications as outlined by Dr. Bevan are generally accepted, and so far as the use of pure nitrous oxide with air or oxygen is concerned, experienced surgeons undoubtedly will agree for the most part with his limitations. There are, however, other factors which must be considered since the experience of many surgeons and anesthetists indicates that by combining it with the local infiltration of novocaine or ether sequence, nitrous oxide-oxygen anesthesia is of great value in extensive major surgery. During the past year these combinations have been used extensively by the Gynecological Staff of the Presbyterian Hospital. Our anesthetics are all given by our regular internes and with very little difficulty. Many extensive abdominal operations have been completed without using a drop of ether. There is no doubt but that by reducing the amount of ether used in a given case we favor a smoother recovery.



Warner has well said: "In the operating room, gas has an advantage over ether anesthesia because the patient gets under its influence more quickly, saving time and because at the close of the operation the patient is conscious and can be returned to his room as easily as any conscious patient. The familiar scenes of delirium in the second stage of ether, with orderlies holding the struggling patient on the table and the surgeon trying to boss the job and at the same time keep sterile, are entirely eliminated. The ether patient who starts vomiting in the corridor on the way back to his room made more trouble than we realized. Everyone took the distressing scene as an occasional necessity, but it certainly never made it easier for others to face the ordeal of an operation."

Having experienced all the terrors of postoperative nausea and vomiting from ether, the writer has a sympathetic feeling for his patients and will not use any more ether in his surgical work than is absolutely needed. Chloroform has been completely discarded.

#### NEED OF EXPERIENCED ANESTHETIST.

There is at present considerable discussion as to how widely nitrous oxide-oxygen analgesia and anesthesia may be employed with safety. All are agreed that any anesthetic is best administered by the specialist. All agree that when properly administered in suitable cases nitrous oxide-oxygen anesthesia is safer than ether or chloroform, but many surgeons and anesthetists maintain that nitrous oxide-oxygen anesthesia should be avoided unless in the hands of an expert. Having been trained in a hospital where the nitrous oxide-oxygen anesthetics have, for the most part, been administered by internes and without a fatality from its use, the writer cannot agree with this attitude, for during the past seven years there has been at least one ether death in this hospital. On the gynecological service we have found it just as easy to train an interne to give a gas anesthetic as to give a satisfactory ether anesthetic; however, one must remember that gas cannot be given according to ether principles or rules. Nitrous oxide-oxygen anesthesia becomes dangerous when the anesthetist ignores its great danger sign, cyanosis. So long as there is no interference with respiration and the patient does not become cyanotic, there is less danger from nitrous oxide than from ether. The trouble is too often with the surgeon. He who would operate successfully with nitrous oxide-oxygen analgesia or anesthesia should be familiar with its administration. If the operation requires more relaxation than can be secured easily with nitrous oxide, nerve blocking, ether sequence or even a straight ether anesthetic is indicated. *The nitrous oxide must not be pushed to the stage of cyanosis.* The surgeon who operates with nitrous oxide-oxygen anesthesia soon learns that the tissues must be handled more gently than when ether is given;

because of this and the lessened toxicity of the anesthetic his patients show less evidence of surgical shock and make smoother recoveries. If the anesthetic must be given by an inexperienced anesthetist, the writer believes that the nitrous oxide-oxygen-ether sequence machine, as is used at the Presbyterian Hospital, is not only safer but more satisfactory than the straight ether anesthesia. However, operating without the cooperation of a trained anesthetist is always unsatisfactory regardless of the anesthetic used, and should be avoided whenever possible.

#### NITROUS OXIDE-OXYGEN ANALGESIA.

Nitrous oxide-oxygen analgesia as it is now used in surgery, obstetrics and dentistry, is the safest anesthetic known, since when given to the stage of analgesia, death from its use is inconceivable. Therefore, it would appear that the only objections to the use of the analgesia must arise from its cost, the difficulty of administering, or inability to afford sufficient relief to the patient. Unfortunately nitrous oxide and oxygen on the per hour basis do cost more than ether or chloroform, but the per hour basis of estimating the cost of an anesthetic is unfair unless considered with the postoperative results. The administration of an intermittent or continuous analgesia with nitrous oxide and oxygen is certainly no more difficult, and the writer believes it less difficult, than a similar administration of ether or chloroform. There is much evidence that the nitrous oxide-oxygen analgesia affords as much relief as the analgesia of ether or chloroform, and in obstetrics, at least in our hands, the results have proved more satisfactory.

It is often easier to operate with a nitrous oxide-oxygen analgesia, the patient being conscious and able to cooperate than with a light anesthesia in which the patient becomes excited when any manipulation is attempted. Evans, a specialist in anesthesia, reports that he has given the gas analgesia throughout for the following operations: Dilatation and curettage, amputation of the cervix, plastic for cystocele, repair of the perineum, curettage of necrotic bone, varicocele, hydrocele, circumcision, empyema, hernia, tonsilectomy, submucous resection, excision of tubercular glands of the neck, leg amputation, radical breast amputation, exploratory laparotomy and appendectomy. The surgeon, however, used novocaine infiltration with most of these. Many gynecological and obstetrical operations have been performed at the Presbyterian Hospital under the combined local anesthesia of novocaine and nitrous-oxygen analgesia. The writer has used the analgesia alone for such operations as dilatation and curettage, amputation of the cervix, anterior colporrhaphy, posterior colpo-perineorrhaphy, versions and forceps deliveries. Experience proves the nitrous oxide-oxygen analgesia of value in both minor and major surgery. Certainly, there are no contraindi-

cations to its use for the adult patient other than inability to relieve the pain, and its safety should appeal to every surgeon.

#### NITROUS OXIDE-OXYGEN ANALGESIA IN OBSTETRICS.

Nitrous oxide has been employed to some extent in obstetrics since 1905, but the extensive use of the prolonged analgesia has been developed during the past four years. Because of the demand for painless childbirth resulting from the exploitation of *Dæmerungsschlaf*, physicians were led to experiment further with the other methods of relieving the pain of labor. Last year Guedel collected from the services in a few hospitals, 1,800 cases treated with the analgesia, and from recent correspondence and interviews I have reports of over 1,200 cases which have had the analgesia since his paper was written. Since these 3,000 cases have been in the practices of only a few physicians, could we have the records of all cases so treated, the number would be much larger. While the use of scopolamine and morphine has been gradually limited to the first stage of labor and used only for special indications, the gas analgesia has been employed by an ever-increasing number of physicians and with very satisfactory results. There are, however, a few women who seem to receive little benefit from the analgesia, and a few others think it little or no better than ether or chloroform. There are some physicians who have considerable difficulty in administering the analgesia, and one obstetrician says that he no longer tries to give it unless he has the assistance of a skilled anesthetist. Some do not consider it either safe or expedient to use the self-administration. But as I have stated in other papers, self-administration is practical in many cases, and if the obstetrician understands the administration of gas and has an easily operated apparatus, good results may be secured in most cases without the assistance of an experienced anesthetist. Some time is required to train the skilled anesthetist to the peculiarities of the obstetrical patient, for she must be handled quite differently from a surgical patient. Some familiarity with the mechanism of labor is invaluable to the anesthetist who may administer gas during normal labor.

#### DIFFICULTIES IN ADMINISTERING THE ANALGESIA IN OBSTETRICS.

The anesthetist who administers a gas analgesia to obstetrical cases soon learns that the patient must inhale enough gas to produce analgesia before the height or painful stage of the contraction, for if the sensation of pain is experienced it is carried through the contraction without amnesia. This necessitates the giving of gas with the first suggestion of an approaching contraction. This may be determined by keeping the hand on the patient's abdomen or by having her signal for gas. In this particular I have found the self-administration of distinct value, since the patient can always get



the gas with the first suggestion of a contraction, which is unfortunately not always the case when depending on an anesthetist to place the inhaler over her face and to release the gas. Everyone has found it very tiresome to sit by the bed, hour after hour, and self-administration has obviated the need of constant attendance. Formerly, if the interne or nurse stepped out of the room for a few minutes, the patient had to endure a painful contraction. With our self-administration the patient may use a little more gas, but the economy in time more than pays the difference in cost. The special anesthetist or constant attendant is usually not needed until near the end of labor when the patient is making bearing-down efforts. The obstetrician who would work successfully with nitrous oxide and oxygen should be familiar with the sensations of gas analgesia. He should be familiar with its administration. A trained assistant or special anesthetist is always desirable, but I would just as soon place my gas machine in the hands of the novice as I would an ether can. With the obstetrician to direct its use the ordinary gas machine is surely safer than chloroform in the hands of the untrained. The difficulties of administering a gas analgesia are usually individual and in most cases the obstetrician can find some way to overcome them.

Nitrous oxide-oxygen analgesia while of very great value in obstetrical practice is not a panacea. Every woman who suffers pain in labor would receive some relief from the inhalation of nitrous oxide if taken in sufficient amount before the height of the contraction. In most cases the severity is relieved, the contractions are made bearable, and in many instances the labor is painless after starting the gas. The long continuation of irritating contractions, the fatigue resulting from a long labor with loss of sleep and the feeling of helplessness tend to make some women hysterical and difficult to control with any form of analgesia. The intelligent cooperation of the patient is always of great value. The power of mental suggestion must never be neglected nor ignored. Winckel, in his early work, observed the difficulty in controlling women of low mentality. It is best that the gas be started before the patient is suffering severe pain, for as Winckel has said: "Women to whom it is not administered until the stage of expulsion can seldom be induced to inhale it quietly, while when administered in the first stage of labor its beneficial action is at once felt and extends to the second stage." Primiparæ often cause more trouble than multiparæ, not only because of the more difficult second stage, but being without a previous experience of labor pain, they are determined to have all suggestion of pain removed unless the obstetrician has carefully explained that the aim in giving the analgesia is to make the pain bearable rather than completely destroy it. Do not promise too much.

A long first stage of labor is always fatiguing and at times somewhat painful. The uterine contractions are in some cases so frequent and strong that sleep becomes impossible, and unless care is taken the patient may become exhausted and very nervous before reaching the expulsive contractions of the second stage. In this type of cases we have been accustomed to give a hypodermic injection of morphine sulphate gr.  $\frac{1}{6}$ , or heroin hydrochloride gr.  $\frac{1}{12}$ , either alone, or combined with chloral hydrate, gr. x to xx per rectum.

In cases with a very irritable uterus the painful stage of the contraction is reached before the patient can inhale enough gas to produce an analgesia. Some of these can be relieved by administering a continuous analgesia, but I believe that heroin or morphine is usually indicated except when this complication comes on near the termination of labor, and then it is usually advisable to give ether for the delivery, carrying the anesthetic beyond the stage of analgesia. Hysterical women, large women of the masculine type and those suffering from obesity, usually require large amounts of gas; sedatives are often needed during their labors, and ether anesthesia may be necessary during the delivery. We believe that the anesthetic should be adapted and modified to the peculiar needs of the patient.

#### EFFECT OF NITROUS OXIDE ON THE BABY.

It has long been known that the fetus may become anesthetised from the mother's inhalation of ether or chloroform. While there seems to be no definite evidence that ether is of permanent harm, the experiments of Graham indicate that chloroform is responsible for some of the hemorrhagic diseases of the new-born. It is generally conceded that there is some danger to the baby from the use of the morphine and scopolamine. Does the use of nitrous oxide have any bad effects on the baby?

When Dr. Webster began the use of nitrous oxide-oxygen anesthesia in operative obstetrics, he was immediately impressed with the fact that the babies cried just as quickly and acted in every way like those of mothers who had no anesthetic. In 1909 when he performed the first cesarean section under this anesthetic, much to the surprise of all, the baby made respiratory efforts and cried immediately on being removed from the uterus. Since 1909 the various members of our staff have performed over forty cesarean sections using either nitrous oxide-oxygen anesthesia, a local infiltration of novocaine, or a combination of the local and nitrous oxide-oxygen analgesia. With the exception of a few cases in which the patient had a sedative previous to the operation, the babies made respiratory efforts almost immediately after they were removed from the uterus. Every normal full term baby delivered by cesarean section has lived.

For several months after we began the routine use of the nitrous oxide analgesia in normal labor, the fetal heart rate was counted at frequent intervals and the babies were watched for any evidence of immediate or remote injury which could in any way be attributed to the use of the analgesia. In one case I administered the gas for more than ten hours, and during the entire period the fetal heart did not vary over five beats. The babies all act as normal at birth and cry as quickly as those of babies whose mothers have no anesthetic. No remote effects have been observed. Four babies, whose mothers had gas, have died from congenital circulatory disturbances.

A critical study of 154 consecutive deliveries at the Presbyterian Hospital shows that the babies of 67 primiparæ, who had the analgesia, with an average weight of 7 lb. 5 oz. at birth, lost 6.7 per cent. of their body weight. On the other hand, the babies of 18 primiparæ, delivered under ether or no anesthetic, lost 7.14 per cent. of a 7 lb. average birth weight. The average labor of the women given, the analgesia was five hours and fourteen minutes shorter in spite of the fact that the average weight of their babies was 5 oz. more. Relieving the pain lessens the shock of labor, and the mothers being in better condition are more apt to have a good milk supply. Conserving the health and strength of mothers means better mothers and healthier babies. Nitrous oxide, being the least toxic of anesthetising agents, seems the logical analgesic to use during the ordeal of childbirth.

Nitrous oxide-oxygen analgesia and anesthesia in surgery and obstetrics has entered a new era. The future will find this anesthetic more employed than the past or present. It has very definite limitations but many possibilities heretofore not appreciated. The technique of administering gas in surgery and obstetrics has been discussed in the second edition of my book on "Painless Childbirth, Eutocia, and Nitrous Oxide-Oxygen Analgesia," and in several papers published in medical journals during the past two years.

The prompt response to my letters of inquiry was gratifying and I wish to thank the doctors who so kindly replied, for their interest in this paper.

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## A PLEA FOR THE RENAISSANCE IN PLASTIC GYNECOLOGY.\*

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One who comes into daily contact with gynecologic patients cannot avoid the conclusion that plastic surgery upon the cervix and perineum is rapidly becoming a lost art.

This seems in part to be due to the belief of the embryonic surgeon that almost anyone can repair a cervix or perform a perineorrhaphy, and also in part to the attitude of the accomplished operator that such minor procedures are unimportant and beneath his dignity, and moreover they do not afford him sufficient opportunity for a spectacular display of his skill.

This is unfortunate because any operation which is worth doing at all is worth doing as well as it can be done, and successful plastic work on the cervix and perineum not only requires dexterity, but also demands thoughtful consideration both of the anatomy and physiology of the structures involved.

To operate upon a relaxed and gaping pelvic outlet in such a manner as to restore the normal function of the pelvic floor requires skill and knowledge in the highest degree, and the determination of when an operation upon the cervix is indicated and the particular operation to be performed in the individual case demands something more than reference to a simple 'rule of thumb.'

The functions of the fascia and muscles which compose the pelvic diaphragm are to close the orifices passing through it, and when they are so damaged as to interfere with this function discomfort and annoyance are the inevitable outcome.

Fortunately the muscles closing the urethral orifice are rarely injured to such a degree as to be wholly incompetent, but those of the vagina often are badly injured, and the sphincter ani is occasionally damaged sufficiently to prevent the control of gas and liquid feces.

The real menace of eroded, unhealed, lacerated cervixes in women who are nearing or past the climateric has but recently been appreciated, and the possibility that malignant degeneration may appear in this structure after it is traumatized, while it is so rare as

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\*The illustrations are reproduced from the author's book, "A Manual of Gynaecology and Pelvic Surgery." Philadelphia: P. Blakiston's Son & Co.

to be a source of much comment in women who have not suffered the injuries of childbirth, has not been sufficiently emphasized.

The earlier gynecologists laid great stress upon the secondary repair of cervical lacerations, but their opinions were based upon what we now believe to have been an incorrect understanding of the importance of these injuries as an etiologic factor in the production of remote reflex nervous symptoms. With the abolition of the notion that scarring of the cervix could be held responsible for distant-symptoms, there unfortunately disappeared that cleverness in the repair of these injuries which was responsible for the beautiful results obtained by the founders of gynecologic surgery, and the cervixes which are now seen after operation are neither things of beauty to the beholder nor a joy to their possessors. And all sorts of minor surgical crimes are committed upon these lacerated cervixes. The tyro is imbued with the idea of repairing every one that has been nicked, and it is not an unusual incident in my own experience to have some terrified, ignorant young woman apply for examination in order to ascertain whether the immediate operation which she has been advised, and in lieu of which her life will remain jeopardized, is a real necessity. *Per contra* the persistent ignoring of possible consequences which one sees when a middle-aged patient with a badly lacerated, eroded, hypertrophied cervix has had her perineum restored, her uterus suspended, and her appendix removed but her cervix overlooked, is much harder to explain. Often indeed this patient has also been subjected to a curettage for her leucorrhea when the endometrium of the uterine body was perfectly healthy but the cervical mucosa was deeply inflamed and infected.

This paper, among other things, is a plea for deliberate consideration of cervical injuries from the standpoint of modern pathology, and the renewal of the habit of good plastic work upon it in view of its physiological function on the one hand and possible malignant degeneration on the other.

This at once brings to the fore the indications for repair. Given a young woman during her active child-bearing years and below the probable cancer age, and her lacerated cervix which is not hypertrophied and eroded nor the seat of infection as revealed by profuse mucopurulent discharge, needs no attention whatever. Should there be hypertrophy, erosion, and infection, the cervix should be repaired, but not by means of the old trachelorrhaphy which too frequently converted an open infection into one which drained less perfectly. In fact, about the only indication for trachelorrhaphy at present is the presence of a small, lacerated, non-infected cervix upon which this operation might be done as a prophylactic measure if the patient must be anesthetized and operated upon for some other purpose. In such an event trachelorrhaphy might be added as a purely subsidiary operation.



The propriety of operating upon an eroded, hypertrophied or infected cervix, the site of an old laceration, could not, however, be questioned if the woman were in the fifth decade, when the likelihood of pregnancy is slight and the possibility of malignant change is great. The absolute necessity for subjecting the material removed from such cervixes to a competent pathologist may be mentioned here for the sake of emphasis.

In all these instances the Schroeder amputation or one of its

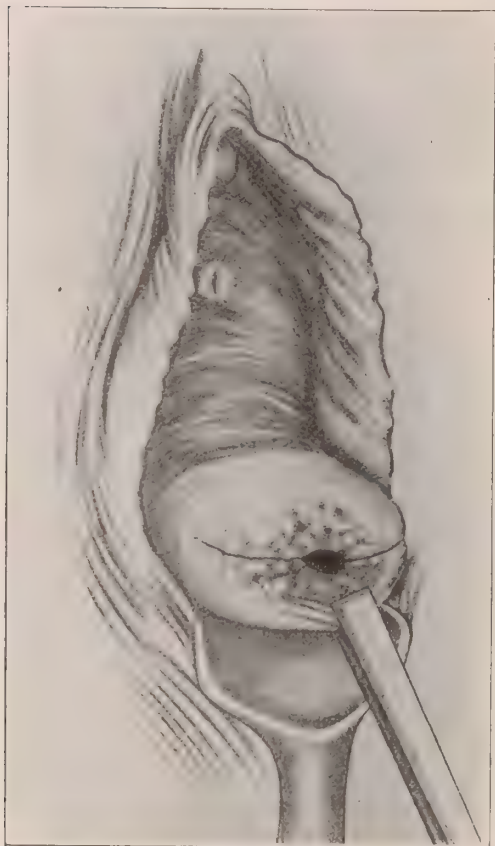


Fig. 1.—Modified Schroeder amputation of cervix for erosion or laceration. Line of incision which splits the cervix.

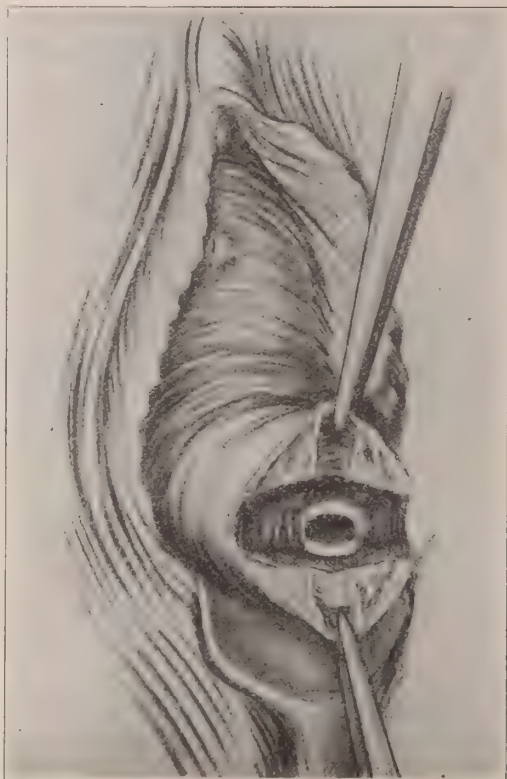


Fig. 2.—Modified Schroeder. At the bottom of the first incision a cut has been made upon each lip at right angles to the first incision.

modifications answers every purpose, since by means of this operation so little of the cervix may be removed that the resultant stump can scarcely be differentiated from a normal cervix and no interference with a subsequent labor is to be apprehended, or the entire vaginal portion can be removed in such fashion that nothing but a smooth vaginal vault with the cervical canal at its apex is to be seen on examination. And all gradations between these two extremes

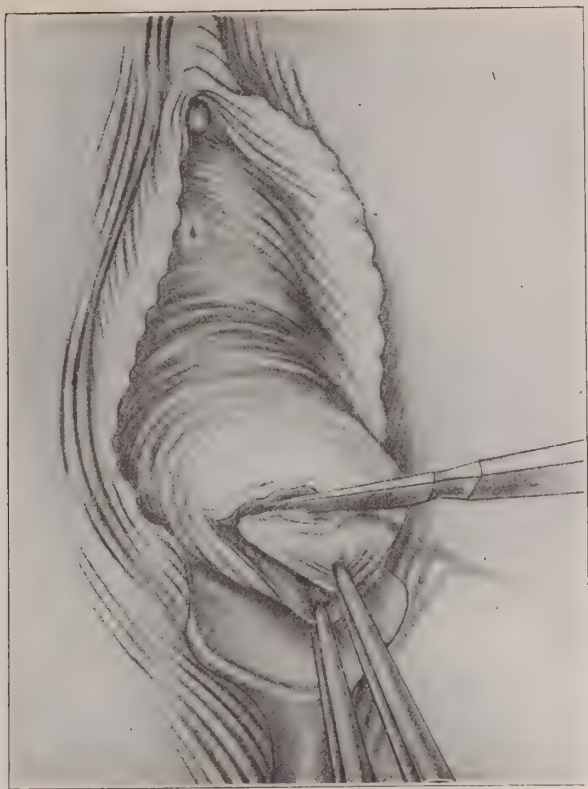


Fig. 3.—Modified Schroeder. A thin shaving is then split from the internal surface of each lip. This shaving may be wedge-shaped, base downward.

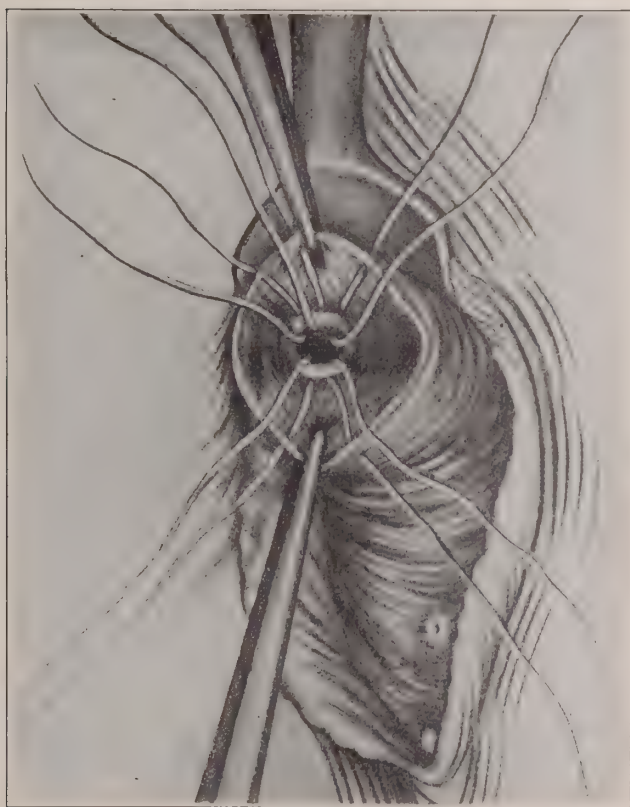


Fig. 4.—Modified Schroeder. The cervical lips are infolded to meet the mucosa of the cervical canal by sutures which are here shown laid but not tied.

may be attained by altering the thickness of the base of the wedge removed and the depth of the primary incision at the lateral portions of the cervix. Fig. 1 shows these lateral incisions and it is plain that they may be as deep as necessary. Fig. 2 shows a cut high up on the internal surface of each lip which is at right angles to the primary incisions and which outlines the depth of the wedge shaped piece to be removed, while Fig. 3 shows the final incision on the anterior lip which may make the removed portion as thin as a shaving or take in the entire infravaginal portion of the cervix. Figs. 4 and 5 show the manner of placing the sutures to restore the cervical canal and either re-form the infravaginal cervix, minus its diseased mucosa, or cover the uterine stump with vaginal mucosa, according to the amount of cervical tissue which has been removed.

Of course, the surgeon who operates daily will sometimes use a circular amputation in preference to the above, but the occasional operator does well to adopt one general plan of operation, modify it according to the necessities of the case, and perfect himself in its use.

On the pelvic floor a great variety of operations is performed in order to restore its integrity. Leaving out of consideration the secondary repair of complete lacerations of the perineum, all of them aim at overcoming either a cystocele or rectocele, or both, and in order to do so they must restore the fascia and muscle to their original condition or in some other manner repair the pelvic diaphragm so that a hernial orifice no longer exists. It should not be forgotten that cystocele, rectocele, and uterine prolapse are herniations through an imperfectly closed orifice in the inferior abdominal wall, and that an almost invariable accompaniment of this is posterior displacement of the anus resulting from an injury which severs the lowermost fibres of the levator ani muscle and the sheets of pelvic fascia which cover it. However, restoration of the posterior portion of the anatomical perineum will not by itself cure a cystocele, and the sheet of fascia extending across in the vesicovaginal septum must be repaired, else the constant wedge-like action of the bladder eventually will force backward the posterior border of the vaginal outlet, with recurrent herniation of the bladder which may drag the uterus with it.

The repair of the cystocele thus becomes the first step in the restoration of the pelvic diaphragm, and no method which contents itself with simple removal of the vaginal mucosa and suture of the raw edges is in the least effectual in this restoration. Neither mucous membrane nor superficial scar-tissue is of any use as a supporting structure, and, until this axiom is understood by an operator, any anterior colporrhaphy which he may perform is destined to come to grief in the course of a few months. So, too, any method





Fig. 5.—Anterior colporrhaphy. Gersuny, of Vienna, adjusts a purse-string suture in posterior bladder-wall.

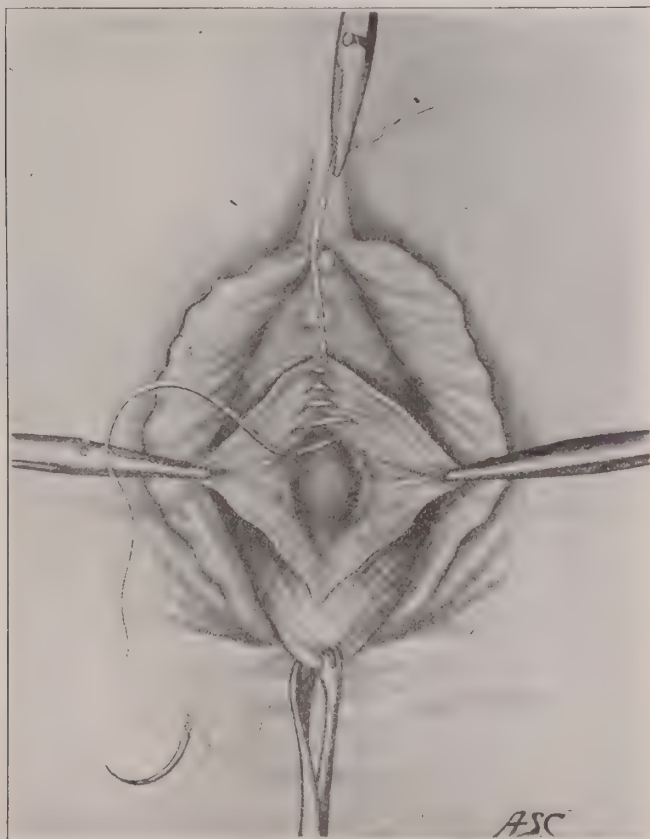


Fig. 6.—Method B. Suturing cut edges of vaginal wall. Deep plane of fascia first closed by continuous stitch.

which shortens the anterior vaginal wall, as by a purse-string suture around an oval denudation, will promote the forward luxation of the cervix and backward displacement of the fundus. In spite of this, a purse-string suture through the *posterior bladder wall*, with inversion of the contained area into the bladder, assists

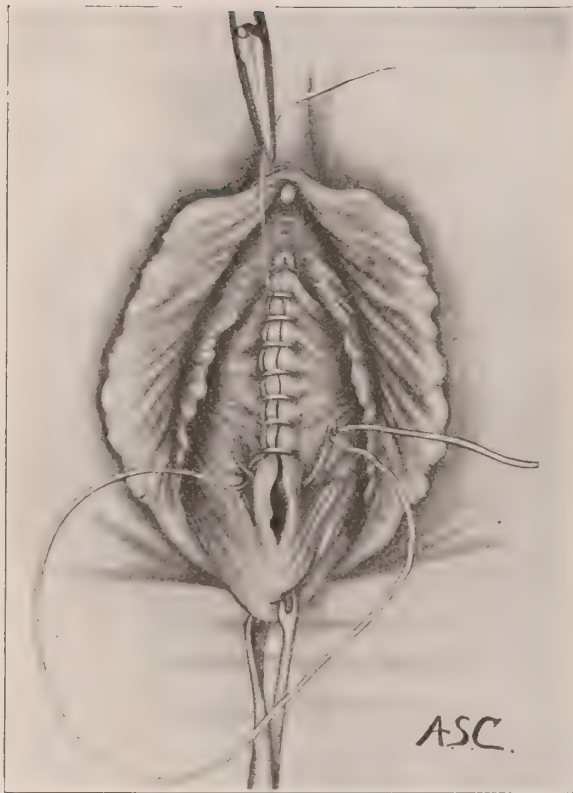


Fig. 7.—Anterior colporrhaphy. Method B. Sutures adjusting broad edges of flaps.



Fig. 8.—Horizontal section of vagina and adjacent structures. (After Henle and Morris.)

temporarily in keeping off some of the strain from the suture line along the vesicovaginal plate of fascia. This was first shown to the writer by Gersuny, and has constantly been in use since that time in very extensive cystoceles in which every particle of support that could be devised was necessary in order to secure a satisfactory result.

Fig. 5 shows the simple application of the purse-string better

than any description could do. The correct methods of suturing, using either one of two methods in the denudation, are shown in Figs. 6 and 7 in which the primary essentials are the suturing of the fascial edges, bringing them together from far out toward the lateral vaginal walls. The denudation which precedes the placing of sutures is easily and correctly accomplished when, and only when the line of cleavage between the posterior bladder wall and anterior vaginal wall is found. Whether this is done by a longi-



Fig. 9.—Secondary repair of incomplete perineal laceration by split-flap method. The posterior commissure is split transversely.

tudinal incision through the latter or by the preliminary removal of vaginal mucosa is immaterial. Once this plane of cleavage is found, the vaginal mucosa is easily stripped back as far as necessary by the gauze-covered finger, and the increased resistance which is appreciable when a perceptible amount of fascia comes into the line of dissection gives a correct idea as to the width to which the denudation should extend. Also the amount of vaginal mucosa which should be removed is shown after the first row of sutures is ap-



plied, running across from one to the other angle of denudation. In a general way but little of the vaginal mucosa in the flaps need be sacrificed, and if the flaps are so arranged that they come together with their broad raw surfaces approximated instead of by their edges only, an anterior vaginal column is formed which temporarily gives a limited amount of support.

For repairing the posterior segment of the pelvic floor, a variety

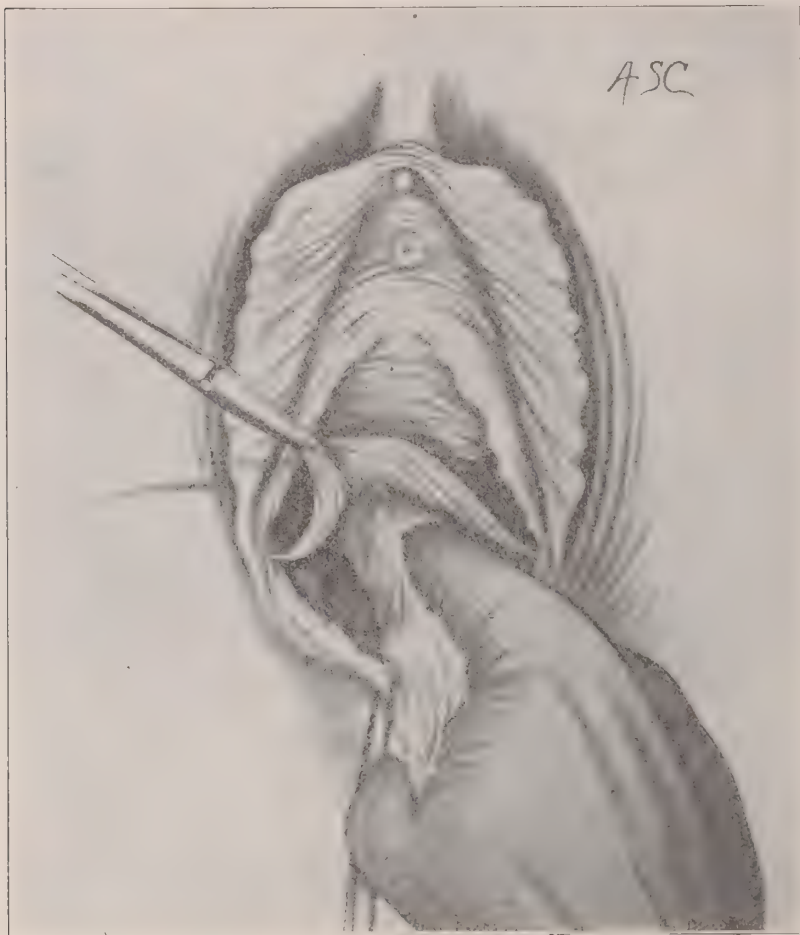


Fig. 10.—Secondary repair of incomplete perineal laceration by split-flap method. The vaginal flap is raised and dissected from the rectum by the finger covered with gauze.

of perineorrhaphies has been devised, but here again that which is needed is a reasonably accurate idea of the end to be sought in the individual case and the material out of which the new supporting structure must be constructed. The classical Emmet operation, if correctly performed, does well if the rectocele is small and the muscles not badly injured. The Hegar is a fair operation when the rectocele is large but the levator ani not seriously injured. Neither

of these typical operations is of much benefit, or at least they suffer in comparison with others, when a large rectocele and badly injured pelvic diaphragm are present in the same patient.

It is often stated that the object of a secondary perineorrhaphy is to restore the perineum to its original anatomical condition, but this obviously is impossible. What must be done, on the contrary, is to close the hernial orifice in such a fashion that the lowermost portion of the rectum (and the anus if possible) is drawn anteriorly

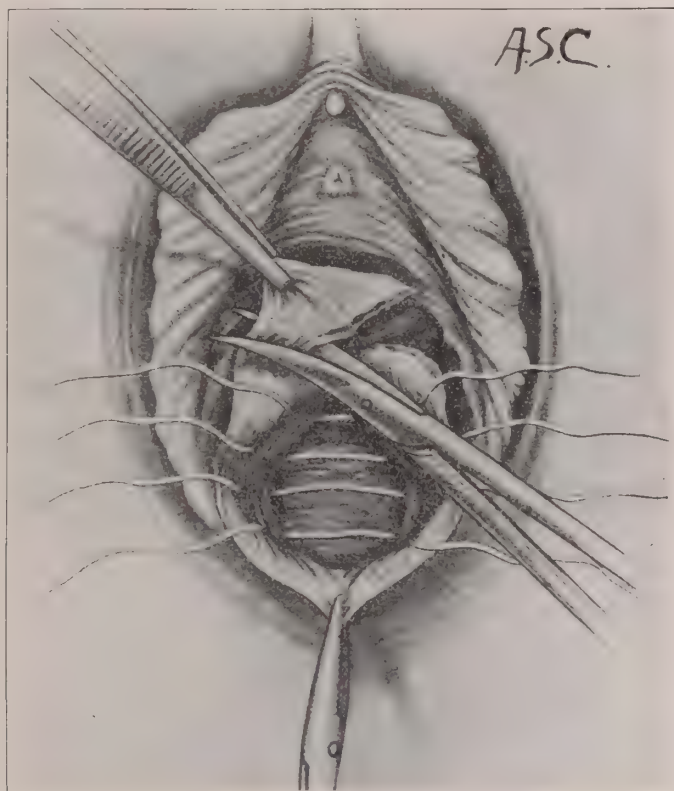


Fig. 11.—Secondary repair of incomplete perineal laceration by split-flap method. Sutures in levators not tied. Flap in process of removal.

until the posterior and anterior vaginal walls are in contact and the obliquity of the vagina is restored.

Attempts to follow the lines of the cicatrix are futile, and in any but the simplest cases removal of protruding mucosa alone is akin to removing the contents of a hernial sac and leaving the orifice to take care of itself.

Normally the pubococcygeal portions of the levator and muscles are responsible for the hugging together of the anterior and posterior vaginal walls, and they achieve this result by reason of the anatomical fact that the two unite *posterior* to the rectum and anus.

This result then is attained indirectly by the forward pull exerted upon the rectum and anus, as shown in Fig. 8. As it is this portion of the levators which is damaged by any injury which allows posterior dragging of the rectum, anus, and posterior vaginal wall, a strict anatomical repair would demand a dissection of these fibres and the fascia covering them and their end-to-end union. As stated above, this is impossible, and the next best thing is to bring the uninjured edge of the levator and fascia upon one side into coaptation

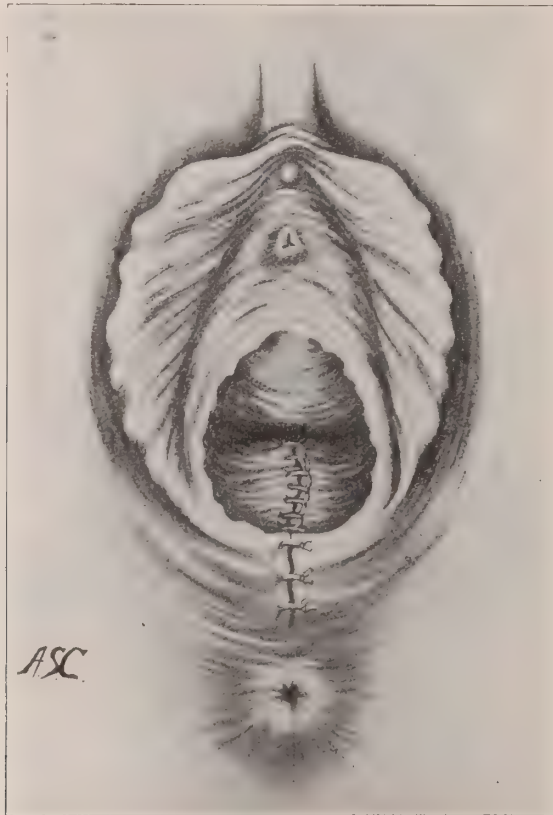


Fig. 12.—Secondary repair of incomplete perineal laceration by split-flap method. The edges of the flap have been approximated after tying deep sutures. The skin sutures are also tied. Operation completed.

with its mate upon the other, and in so far as the muscle on each side is shortened to a corresponding extent, the rectum is brought anteriorly, and in addition the suturing together of these muscle fibres and their fascia posterior to the posterior vaginal wall gives a muscle pull upon the relaxed outlet, which cannot be so well obtained in any other manner. It is immaterial how the levators are exposed so long as the suturing is properly performed, but the simplest, surest, and most rapid method is by an extension of the old



Tait flap-splitting operation through which the dissection is made as high and wide as necessary, after a preliminary incision at the junction of the posterior vaginal wall and the skin perineum. Fig. 9 shows the incision, Fig. 10 the blunt dissection, and Fig. 11 the method of suturing, together with removal of the redundant portion of the posterior vaginal wall. Fig. 12 shows the operation completed with a lock-stitch in the vagina to control hemorrhage, and interrupted skin sutures. It is to be noted that the uppermost portion of the vaginal stitch should be tied above the line of incision to control bleeding, which always is brisk at the very apex of the cut which removed the vaginal flap.

The length of this paper does not permit a description of the repair of complete perineal lacerations, but secondary repairs for tears extending into the rectum fortunately are much less common than in years gone by, because of better obstetric practice and better primary repairs.

If the results of this paper shall be to stimulate more careful attention to plastic pelvic work on the part of experienced operators, and close study of the subject on the part of the younger men, its object will have been accomplished.

## TETANY AS A SEQUEL OF GYNECOLOGICAL OPERATIONS AND AS A COMPLICATION OF PREGNANCY.

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Tetany is most common in infancy and early adult life when males are apparently more susceptible to the disease than females. Later in life, however, females are affected in larger proportion and a special predisposition to tetany is noted in pregnant, puerperal and nursing women. Maternal tetany is one of the oldest known forms of the disease, but notwithstanding its importance it has been somewhat slighted on the part of obstetricians and gynecologists.

A good description of the disease was given by Steinheim in Germany in 1830, as well as by the French observer Dance in 1831. The term "rheumatic contracture of nursing women" was proposed for it by Trousseau in 1854, who noted a considerable number of such cases within a short time and is the discoverer of the phenomenon named after him.

In the last few decades tetany, it is claimed, has become so rare in Paris that Charcot had not seen a single case in thirty years (Kehrer). Judging from the literature, this disease at the present day seems to be rather rare as a sequel of surgical intervention in women. On account of its manifestations, tetany was formerly sometimes described as intermittent tetanus. The clinical picture of tetany consists of attacks of tonic spasms of the extremities, which are symmetrically fixed in rigid flexion of the various joints, the muscles being hard as stone to the touch during the seizures. In some of the cases the attacks last only a few minutes, but in others they may persist for several hours or even days. The upper extremities, more particularly the muscles of the hand and of the fingers, are usually affected in the form of accoucheur's or writer's cramp position, and very frequently tetanic contractions extend also to the muscles of the foot. Pain is of only moderate severity, and consciousness remains entirely clear during the attack.

Upon the basis of a case which recently came under the author's observation, the relations between tetany and gynecological operations were investigated by him with special reference to the etiology of this condition which is still a subject of controversy. The case is as follows:—

The patient, a woman of thirty-two years, native of Austria, was

admitted to the German Hospital of New York City for severe dysmenorrhea of six months' standing; had been married; sterile for eleven years. Patient was operated upon three years ago for appendicitis and right adnexal disease. According to the patient's statement she suddenly became "dumb and blind" without any prodromal symptoms during her convalescence after this operation. This disturbance subsided in the course of a week or ten days and she was in good health until she came under observation. No special stigmata of nervousness or hysteria were demonstrable. The gynecological examination showed a small, hard cervix with a tightly contracted os. Corpus anteflexed, of normal size. Left adnexa normal, right adnexa not to be felt. Parametria normal. Diagnosis, stenosis of the external orifice.

*Treatment.*—Curettage, followed by the performance of a Pozzi operation upon the cervix. Four days after operation a slight rise of temperature ( $101.4^{\circ}$  F.) was noted with a dry non-productive cough, subsiding within a few days, although the temperature did not return to normal. After operation, without warning of any kind, the patient's entire body stiffened, her head was thrown back and held in a rigid position, the hands and feet assumed the characteristic attitude of tetany. Slight transitory trismus was also present and reappeared on the next day. The temperature at this time was  $100.8^{\circ}$  F.

For the next two weeks without intermission the patient presented a clinical picture of the following description: Consciousness was entirely preserved and severe pain was complained of. The neck was held rigid and the head was thrust forcibly backward, the hands were clenched in typical accoucheur's position; the feet were extended with flexed toes. The Chvostek and Trousseau signs were demonstrable, and the knee-jerks were exaggerated. Clonus and Babinski's sign were absent. There was a greatly exaggerated response to both the galvanic and faradic current. During sleep the general spasticity was apparently relaxed, but at the slightest touch on the patient's skin the spasms became at once as evident as before.

In the treatment sedatives and narcotics as well as parathyroid therapy proved inefficient. On the assumption of the condition being referable to parathyroid insufficiency, the patient received parathyroid extract in  $\frac{1}{4}$  to  $\frac{1}{2}$  gr. doses three times daily during two weeks, but the tetany was not relieved thereby. Calcium in 5 gr. doses was administered together with the parathyroid extract. The ordinary sedatives, such as chloral, veronal, bromides, and an occasional dose of morphine were used for the control of the severe pain and insomnia.

The duration of the disease in this case extended over the usual period of a few weeks, apparently uninfluenced by treatment.



Hypnosis was tried and was readily induced, the patient being of a highly suggestible type, but it failed to relieve the spasticity. At the end of two weeks the clenched hands could be partially opened, but not without excruciating pain. Dating from this period the spasticity gradually subsided, and six weeks after the onset of the tetany the patient's control of her extremities was restored. Nine weeks after her admission she left the hospital cured. While tetany practically always terminates in recovery, recurrences are not at all uncommon, and it is not improbable that the patient's preceding postoperative experience (concerning which no details were obtainable) was in some way related to the present attack.

In view of the relative infrequency of tetany as a sequel after gynecological operations, the following tabulation of illustrative cases has been prepared from the literature, beginning with the eight observations reported by Kehrer:—

CASE I.—Patient twenty-two years of age, with history of goitre operation in the past, developed puerperal tetany after normal childbirth. Three months later, surgical intervention was required in the form of *curettage* for hemorrhagic endometritis in a retroflexed uterus. The chronic puerperal tetany—which had so far manifested itself by nocturnal attacks of pain and stiffness in both arms and fingers, lasting about half an hour—was rendered acute through the gynecological operation; the arms were extremely painful and strongly flexed in the elbow-joint; the fingers were clinched in a fist and there were spasms in the legs. The tetanic attack subsided on immediate administration of calcium in large doses; the patient had no further attack and made a good recovery. (Ref., Kehrer: *Archiv fuer Gynækol.*, Vol. XCIX, p. 372.)

CASE II.—*Posterior colporrhaphy*, with plastic work on the perineum and wedge-shaped excision of the anterior and posterior lip of the os uteri, in a delicate patient twenty-nine years of age, was followed five hours later by a distinct attack of tetany with typical accoucheur position of the hands, tingling and painful sensations in forearms and hands, as well as around the mouth, so that she was unable to speak. An attack of vomiting three hours later was followed by a second and final tetanic seizure. The patient made a good recovery under administrations of calcium. (Ref., Kehrer, *ibid.*)

CASE III.—*The extirpation of a vaginal cyst, anterior plastic (colporrhaphy) and colpoperineoplastic*, in a woman thirty-nine years of age, four and a half months after the last childbirth, was followed by tetany fifteen minutes after the termination of the operation. The treatment consisted in the internal administration of calcium, and by the next day all symptoms of tetany except the positive Chvostek sign had disappeared. (Ref., Kehrer, *ibid.*)

CASE IV.—*Curettage*, on account of hemorrhage, in a woman

of thirty-four years, with vaginal prolapse and retroflexed uterus, was followed two days later by tingling sensations, pain and stiffness in fingers and toes with a strongly positive Chvostek and a weakly positive Trousseau. (Ref., Kehrer, *ibid.*)

CASE V.—*Extirpation of an inflammatory tumor of the left adnexa, ventral fixation of the uterus and appendectomy*, in an anemic woman of twenty-one years, was followed by a well-marked attack of tetany on the evening of the day of the operation, with typical accoucheur position of the hands. Chvostek's facial phenomenon which had been present prior to the operation was enormously increased. Calcium had been prescribed two weeks previously and was now given freely by mouth. By the next morning all tetanic manifestations with the exception of Chvostek's sign had disappeared. (Ref., Kehrer, *ibid.*)

CASE VI.—At the instant of the *reposition of a retroflexed myomatous uterus* under general (light ether) anesthesia, in a woman forty-one years of age, tetany set in with sudden arrest of respiration, typical writer's cramp position of the hands, spasm of the extensor muscles of the arms, pes equinus position of the feet. The arrest of the respiration lasted about a quarter of a minute, and the spastic condition persisted from two to three minutes. Chvostek's sign was extremely marked after the patient awoke from the anesthetic. Large doses of calcium resulted in the disappearance of Trousseau's phenomenon and general improvement of the nervous hyperirritability, including Chvostek's facial sign. (Ref., Kehrer, *ibid.*)

CASE VII.—*Anterior and posterior colporrhaphy, and ventral fixation of the uterus*, in a woman thirty-three years of age, was followed by tetany twelve days after operation, the patient's hands suddenly assuming the typical accoucheur's position. Chvostek's sign was well marked. About a week later spasms were noted in the upper and lower extremities. (Ref., Kehrer, *ibid.*)

CASE VIII.—*Purulent endometritis*, presumably treated by irrigation or other intervention,—as Kehrer includes this case under tetany following gynecological operations,—in a woman of twenty-eight years, was combined with dragging, tingling sensations and painful tension in both hands and feet, as well as pronounced Chvostek's sign on both sides of the face. After two days' internal medication of calcium, the disturbances in the hands and feet suddenly disappeared, followed some days later by almost complete subsidence of Chvostek's facial phenomenon. (Ref., Kehrer, *ibid.*)

CASE IX.—*Curettage for incomplete abortion* in the second month, in a very anemic woman, thirty-nine years of age, elicited a typical attack of tetany with Chvostek's sign, at the beginning of the operation; the contractions ceased after the patient had been put to bed. A second curettage, about nine months later, for persistent menor-

rhagia gave rise to a similar attack of tetany, with spasms of the legs, accoucheur position of the hands, Chvostek's sign, and increased galvanic irritability. A week later, intrauterine cauterization with formalin was performed, without causing an attack of tetany. (Ref., Gross: *Muench. med. Wochenschr.*, 1906, Vol. LIII, No. 33.)

CASE X.—*Intrauterine irrigation (alcohol) and removal of a piece of placenta*, on the sixth day after normal childbirth, in a woman of thirty-six years, was followed by tetany in form of intermittent bilateral tonic spasms, beginning on the seventh day of the puerperium. These spasms still persisted seven months later, having gradually diminished to two or three daily, after having been extremely frequent at first. Curettage of the uterus had been performed in the interval since the childbirth. All the typical signs for tetany were demonstrable. (Ref., Preiss: *Monatsschr. fuer Geb. und Gyn.*, 1909, Vol. XXX, p. 633.)

CASE XI.—*Perineoplasty*, in a woman twenty-five years of age, IX para, four months after the last childbirth, was followed by typical tetanic spasms immediately after the performance of the operation (under chloroform anesthesia). On the following day, typical tetanic spasms supervened with accoucheur position of both hands and plantar flexion of the feet; the spasms occurred nearly every half hour, lasting from two to five minutes and causing rather severe pain. From the third day on the spasms became less frequent and diminished in extent as well as in severity; from the eighth day on they appeared once or twice daily. After the removal of all sutures on the eleventh day, the spasms returned with renewed severity, especially in the toes. The last attack of tetany occurred on the thirteenth day, after which day the spasms disappeared entirely. (Ref., Goth: *Zentralbl. fuer Gyn.*, No. 15, 1903.)

CASE XII.—*Abdominal puncture* led to an attack of tetany in the case of a woman twenty-eight years of age, who was operated upon for abdominal ascites possibly due to peritoneal cancer. After the evacuation of about 8 litres of a serous fluid, paresthesia appeared in the upper extremities, and this was followed by an attack of tonic spasms with typical accoucheur position of the hands lasting fifteen minutes. Chvostek's sign was demonstrable during the attack. No further tetanic seizures followed until the patient's death from cancer of the stomach. (Ref., Marschner: *Deutsch. Arch. fuer klin. Med.*, 1896, p. 501.)

CASE XIII.—*Curettage of uterus for hemorrhage* following abortion at the third month led to an acute attack of tetany on the operating table, at the beginning of the narcosis while the patient was still conscious. The attack was associated with accoucheur position of the hands, spasms in the arms and legs and arrest of respiration for about half a minute; also bilateral Chvostek and



left-sided Trousseau phenomenon, tingling sensations in the fingers, enormous hyperirritability of the radial nerve and entire brachial plexus. Recovery followed under large doses of calcium, and the patient was discharged well on the tenth day. (Ref., Kreiss: *Zeitschr. fuer Geb. und Gyn.*, 1914, Vol. LXXVI, p. 1.)

CASE XIV.—*Perineoplastic* in a woman thirty-seven years of age. Prior to the operation, patient received an injection of 3 c.cm. stovaine after withdrawal of 15 c.cm. of spinal fluid. About two hours after the operation, typical spasms made their appearance with paresthesia and pain. Erb's and Chvostek's signs were positive. (Ref., Curschman, quoted by Frankl-Hochwart, Monograph, 1907.)

CASE XV.—Tetany followed in a case of *uterine myoma*, after injections of ergotine into the skin of the abdomen, in a woman forty years of age. Typical peripheral spasms, with Trousseau's and Chvostek's signs were present. The spasms of the extremities were most pronounced after the injection, diminishing on the next day and increasing again upon each new injection. The omission of the injections was immediately followed by subsidence of the tetanic manifestations. (Ref., Schlesinger: *Zeitschr. fuer klin. Med.*, 1892, Vol. XIX, p. 468.)

It is noteworthy that in Cases XII and XV tetany followed upon abdominal puncture and subcutaneous injection respectively. While not typical gynecological operations, the surgical procedure, adopted in these women suffering from uterine myoma and abdominal ascites respectively, is nevertheless of a character to justify the inclusion of these cases under the heading of tetany as a sequel of gynecological interventions.

Whereas the occurrence of tetany after gynecological operations, is very unusual, the obstetrical literature contains many authentic observations on tetany in maternity cases. The pathognomonic signs of maternal tetany are the same as in other forms of the disease: (1) Trousseau's phenomenon, meaning that as long as the disease persists, the spasms can be produced at any time through pressure upon the main nerve and vascular trunks, for example through constriction of the extremity; (2) Chvostek's phenomenon, meaning that gentle stroking with the finger from the temple toward the lower jaw will at once elicit a contraction of all muscles supplied by the facial nerve; (3) Erb's phenomenon, consisting in an increased electric irritability of the motor nerves.

A constant response of the peripheral muscles to the arm and leg tests in tetany was first described by Pool in 1907, and is now known as Pool's phenomenon. The spasms of tetany are more apt to be intermittent than the contractions of tetanus, and trismus,

an early symptom of tetanus, appears very late or is altogether absent in tetany.

In a considerable number of cases the disease has been observed to develop after operations on goitres with more or less damage to the parathyroids, aside from the partial removal of the thyroid gland. Tetany has also been described as occurring in epidemics, especially in certain towns of Southern Germany and Switzerland. A number of cases occurring within a few weeks were recently observed by Kehrer in the gynecological clinic in Bern. The first three cases concerned tetany during lactation; in two other cases the infant participated in the maternal tetany; and in two others the tetany affected only the newborn child.

In addition to two personal observations on tetany occurring in the course of pregnancy, Kehrer enumerates from the literature 29 cases of tetany first occurring in pregnancy, 25 cases of recurrent tetany in pregnancy, 4 cases of tetany in pregnant women who had previously suffered from the disease, 7 cases of tetany during pregnancy after goitre operations in the course of the gestation, 2 cases of tetany in pregnant women who had previously been operated on for goitre, 3 cases of tetany first occurring in the act of parturition, 22 cases of tetany first appearing in the puerperium or during lactation, 8 cases of recurrent tetany in the puerperium or during lactation, 3 cases of tetany in puerperal women who had previously suffered from tetany. To this compilation Kehrer adds a case of lactation tetany, another case of probably chronic gestation tetany which became acute in the puerperium, an observation on typical tetany occurring for the first time in the puerperium, two cases of tetany in the mother and newborn child, mild in the former but severe in the infant, a case of tetany in pregnancy due to oxalic acid poisoning, and a case of gestation tetany.

Maternal tetany is sometimes repeated in successive pregnancies. The part played by gestation in the pathogenesis of tetany was originally shown by the classic experiment of Erdheim upon a rat from which he removed the parathyroid glands. This operation was not followed by tetany, an accessory parathyroid gland being present; the animal recovered and became pregnant. Towards the end of this pregnancy typical tetany developed and disappeared again after parturition. The same phenomenon was repeated in the next following pregnancy. Erdheim leaves it an open question whether the onset of tetany in pregnant women, without preceding goitre-extirpations, should be referred to parathyroid disease and insufficiency or to an overproduction of the poison, presumably derived from the placenta, which the parathyroids are supposed to neutralize. Attention is called by Kehrer to the fact that in cases of pregnancy-tetany, the fetus is not unusually born dead, or in a macerated condition.

Disturbances on the part of the endocrinic glands, more particularly the parathyroids, are now known to be responsible for many abnormal conditions, especially nervous diseases, during and after pregnancy. Maternal tetany, according to a modern interpretation, is the result of insufficient function of the parathyroid glands, which in its turn is caused by a deficit in calcium salts, the calcium requirements of the fetus leading to calcium impoverishment in the mother. This view is confirmed by the relatively rare occurrence of tetany in primiparæ, and also in its greater frequency in the second half of pregnancy, as well as its tendency to repetition and aggravation in subsequent pregnancies. The fine equilibrium of the internal secretions is sometimes overthrown by the tax imposed on the maternal organism through the exigencies of the growing fetus, especially in women whose scanty parathyroid secretion is barely sufficient for their own requirements. The tetanic symptoms in these cases are a manifestation of endocrinic insufficiency; and the favorable effect of calcium in many patients is not surprising in view of the generally admitted foundation of tetany on an impairment of the calcium metabolism, with diminution of the calcium contents of the body-tissues and the blood. The onset of tetany in gynecological cases is also usually referred to a lack of calcium in the system, and the occurrence of the spasms in connection with myoma hemorrhages is probably due to the loss of calcium-containing blood. Kehrer emphasizes the onset of typical tetanic spasms as the result of hemorrhage and the loss of tissue juices in meno- and metrorrhagias as well as profuse uterine discharges especially in purulent endometritis. Loss of blood besides the effect of the general anesthetic is probably likewise responsible for the cases of tetany observed after curettage and major gynecological operations.

Concerning the prophylaxis and treatment of maternal and post-operative tetany, the administration of calcium is followed by prompt and excellent results in the great majority of cases. Large doses were given by Kehrer to these patients, and it is interesting to note that a woman suffering from chronic puerperal tetany, which three months later became acute through uterine curettage, had no further attacks after this medication. The favorable effect of the lime in these cases strongly supports the view that a deficiency of calcium in the organism is responsible for the onset of tetany. Treatment in the author's case consisted in the administration of parathyroid extract and calcium, which, however, had little effect on the duration of the disease.



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## DIAGNOSIS AND CAUTERY TREATMENT OF CARCINOMA OF THE CERVIX.

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The data for this paper are based upon 100 cases of cancer of the cervix examined and treated in the Mayo Clinic between February 1st, 1914, and July 1st, 1916.

The diagnosis of carcinoma of the uterine cervix should in the great majority of cases be a very simple and easy problem. It is usually only the very early case which presents any difficulty. Such a case comes for examination with a history of slight spotting or staining of the underwear, slight bleeding at intercourse or when taking a douche, or perhaps a show of blood after some unusual exertion. It may be there is no history of hemorrhage, but an increased or profuse leucorrhea. There is very little if any odor to the discharge in these early cases. Digital examination shows the presence of a roughened cervix, and when the examining fingers are inspected afterwards they may be blood-stained.

Too frequently treatment is instituted in cases of cancer of the cervix without a vaginal examination having been made. From the histories taken at the time the patients presented themselves for surgical treatment, I have found that 65 per cent. of such patients consulted two or more doctors before a vaginal examination was made. Never permit modesty to come between you and the making of a thorough, careful examination. If the patient objects after the situation and conditions have been explained to her, she had better go to the other doctor in the beginning, because she is sure to go later and at your expense.

Examination with the vaginal speculum and with the aid of a good light may show a small ulcerated area on one lip of the cervix. We will say that this ulcerated area is the size of the thumb nail. It may be either an ulcerated area or a fungoid patch of tissue. In either instance it will bleed easily upon manipulation. So also will highly inflammatory conditions of the cervix. It will feel hard and brittle to the examining finger. So also will any acute inflammatory process; a luetic ulcer, for instance, is very hard to differentiate. From the history which the patient gives in these very early cases you cannot say positively even after feeling and seeing the erosion that it is or that it is not carcinoma. An indurated, infected cervix

may show all the symptoms which an early carcinoma of the cervix will produce.

Fortunately, we have a sure way of telling just what the tissue is with which we are dealing, and that is by the use of the microscope. A small specimen a quarter of an inch in size can be excised without using any anesthetic and can be examined by the aid of the freezing microtone in a very few minutes, and then you have proof positive. The freezing microtone should be part of the equipment of every surgeon's office and he should master its use. Every surgeon should have a working knowledge of pathology and make use of it.

Many cases of carcinoma of the cervix will not consult a physician until the mass at the cervix is as large as an English walnut or larger. Then the diagnosis is easy and relatively very sure even without the use of the microscope. However, in these cases a specimen should always be examined microscopically before any treatment is begun. I do not think there is greater danger to the patient in excising a specimen for diagnosis in cases of cancer of the cervix than there is in making the ordinary vaginal examination in such cases with its attending traumatism to the new growth.

But in proportion as the diagnosis is easy the cure is difficult. With a large ulcerating mass in the pelvis, with a foul, stinking discharge and repeated hemorrhages, anyone can make a diagnosis. But in such a case a diagnosis is of little value. The average length of time which elapses from the beginning of symptoms till the first visit to a doctor is five months. The average length of time from the first symptoms till surgical treatment is begun is between twelve and thirteen months. In other words, many of these cases are not seen early by any doctor, and after they do consult a physician they are slow about having any surgical treatment. Think of it! Seven months between the time the doctor is consulted and the time of surgical treatment. Who is to blame? As soon as seen and a diagnosis is made the patient herself should be told the plain, unvarnished facts. Much has been done during the past few years in trying to educate the American public regarding a few of the minor truths pertaining to cancer. It is a splendid work and I hope it may continue. It is only when we can see these cases early that a cure may be hoped for. And as long as womankind attributes all ailments to her natural lot and until she is taught to look with suspicion upon all unnatural discharges from the vagina, we cannot hope to see these cases early.

Unfortunately, pain is a late symptom in cancer of the cervix. It is a pity that severe pain is not an early symptom in all cancer. If it were, the number of cures would be multiplied hundreds of times. If severe pain were an early symptom of cancer the number of cures would be so great that there would be no question about the advisability of surgical treatment, and the cases would be seen



early. The pain which comes on late in cancer of the cervix is for the greater part due to the pressure exerted upon the pelvic nerves, and to a neuralgia due to the close proximity of an inflammatory process. It is often spoken of as 'rheumatic' and neuralgic in character, and usually referred to the hips and small of the back. Often the pains are 'bearing down' in character. The very late case often suffers a great deal and the use of opium in the form of opium and belladonna suppositories has to be employed.

The average age of these patients is forty-two years, and 93 per cent. of our series had borne children. The average age of the youngest child from patients of this series was eleven years. Here again we can see the influence of chronic irritation in the production of carcinoma.

I am a firm believer in the statement that "chronic irritation plays an important rôle in the production of carcinoma." How frequently do we see cancer of the breast follow an old chronic mastitis. Then we have the smoker's cancer, or cancer of the lip. "Out of thousands of cases of cancer of the lip operated in the Mayo Clinic only one case was on a woman, and she smoked a clay pipe." There is the chimney-sweep's cancer of the scrotum; the betel nut cancer of the natives of the Philippine Islands, where they are in the habit of chewing the betel nut. A high proportion of them develop cancer of the buccal mucous membrane. That cancer of the stomach often is the end-result of an old gastric ulcer, there can be no doubt. About 30 per cent. of the cases of carcinoma of the rectum are associated with hemorrhoids. Primary cancer of the liver is a very rare disease, except when gall-stones are present. On the other hand, about four patients out of every hundred who have gall-stones for more than ten years develop cancer of the liver.

Reasoning in accordance with the above facts, I cannot help but feel that an old laceration of the cervix (with its resultant scar tissue) is frequently one of the causative factors in the production of cancer of the uterine cervix.

The odor of the vaginal discharge is said to be diagnostic. It truly is, but it is not an early symptom—often a very late one. And if one waits to make the diagnosis from the foul odor, his patient has lost her best chance of being cured. The odor is the result of the infection of the ulcerated, necrotic mass in the vaginal vault; it is characteristic of vaginal odors. Many surgical cases can be diagnosed by one who is familiar with different odors. Cases which have had an operation on the mouth have a characteristic odor. So do cases which have had a rectal operation. It is a part of the physician's education to have an educated sense of smell.

Hemorrhage or a blood-stained discharge is a valuable symptom. Free hemorrhage as such is often not an early symptom, but is most frequently the thing that drives the patient to the physician. In

about 30 per cent. of cases a free, sudden hemorrhage is the patient's first warning. In about 30 per cent. the first warning signal is a prolonged menstruation or a recurrence of what the patient considers a natural menstruation. From 10 to 15 per cent. will have their attention first attracted by blood-stains at intercourse, when taking a douche, or upon exertion. A certain percentage is discovered during the course of routine examinations. An unnatural discharge of blood from the bladder or kidneys; from the reproductive organs of the female; from the bowel, or from the stomach should always be a cause for suspected malignancy, and should be considered as such until proved to be due to some benign cause.

Regarding the treatment of cancer of the cervix by different types of operations and by different methods, much has been written. Lately the Percy method of cauterization has been under discussion, and during the past two years I have had opportunity to observe the immediate results of this method. Of just what value this method of cauterization for carcinoma of the cervix can prove to be, will not be known until sufficient time has elapsed to enable those who are using the method to report a series of three- or five-year cures. Much has been published in the literature during the past few years; some write to advocate and others to condemn the method. Here and there an isolated history is inserted to sustain this or that theory, and a few have reported a well-digested series of case records from which one is able to draw conclusions. It is neither the occasional brilliant result nor the frequent failure that counts in a work of such character, but it is the correct analysis of all the cases that have come under the surgeon's care with full histories and a painstaking follow-up record that permits the reader to judge for himself the real value of the procedure.

We began the use of the Percy method of cauterization in February, 1914. With experience in use of the method some changes developed. In the original technique it was advised that an assistant hold the uterus and direct the movements of the iron. The surgeon now holds the uterus with his left hand in the pelvis and manages the cautery with his right hand. With the patient in the perineal position (and the abdomen open) this is easily done. The advantage in the surgeon having his hand on the uterus during the cauterization is obvious. He can tell exactly where the head of the cautery iron is all the time and can better direct the iron in going to the fundus of the uterus; he can always judge just about how much tissue there is between the iron and the pelvic cavity, and what is most important the operator himself always knows about the degree of heat which is being transmitted through the tissues.

We have discarded the use of the vaginal dilator which was recommended. In a few cases, where the vaginal dilator was used, we noticed that there frequently occurred a fine linear tear of the

mucous membrane of the vagina upon dilatation. Later we noticed that cases were returning with implants of carcinoma in the vaginal wall in places corresponding to these linear tears. We are very careful to avoid any abrasion of the vaginal mucosa and always use the smallest (of the water-cooled) vaginal speculæ. Following the cauterization the vagina is thoroughly washed out with tincture of iodine. The time is fast coming when all surgeons must recognize the ability of carcinoma to produce autographs. We must learn to handle it the same as we would the most virulent infection or else take the responsibility of reimplanting it on our patient.

During the past year in addition to doing the cauterization on these cases we have been ligating the internal iliacs and one or both ovarian arteries. This has been done not with the idea that the procedure was of great value *per se*, but in order to control the hemorrhages which occur in about 40 per cent. of the cases if it is not done. In 30 cases which have been ligated we have had no trouble with post-operative hemorrhage. Until we began to ligate the internal iliacs, hemorrhage was a very frequent complication, occurring usually about the twelfth or fourteenth day after the cauterization or at the time the slough detached. It is true that a tight pack will control the hemorrhage, but occasionally a patient will become almost exsanguinated before the packing can be placed. It adds only about fifteen minutes to the length of the operation to do the ligations, and is surely a valuable adjunct to the cauterization in controlling the post-operative hemorrhage, to say nothing of the peace of mind it affords the surgeon. Another post-operative complication which we have had has been vesicovaginal fistulæ. Out of 100 cauteries done in this clinic we have had ten vesicovaginal fistulæ. Of these 10 cases I do not know but one case that is draining urine at the present time. They have healed spontaneously with one exception which was closed by operation, and I feel confident that that case would have closed had it been given sufficient time. It has required on an average of about three months for them to close. The fistulæ are usually of the vesico-utero type and have varied in size. In doing the cauterization every effort is made to protect the urinary bladder, but not at the expense of not curing the disease. I should much prefer to produce a fistula and cure the disease than to fail to cure the disease and protect the bladder. My experience with recauterization has not been an especially favorable one, and every effort is made to destroy the disease with the first cauterization.

The operative mortality has been 1 per cent., one patient having died in the hospital, and that death was not attributed to the operation itself. The patient was a very fleshy woman with cardiovascular changes and a very poor operative risk; she stood the operation very well and was ordered out of bed into a chair on her seventh



day. A few minutes after getting up she fainted and had to be put back to bed. She never rallied from the fainting spell and died within two hours. Post-mortem showed an acute dilatation of the heart and advanced myocarditis.

A total abdominal hysterectomy has been made on twenty-six of these one hundred patients who have had a Percy cautery. It is our opinion that one of the great values of the Percy cautery is that it will in many cases change an inoperable case into one that is plainly operable.

Of the twenty-six total abdominal hysterectomies which were done on cases which had had a previous Percy cautery, the pathologists were unable to find carcinoma in nineteen of the specimens removed, but found it present in the remaining 7 cases. The following table will show the number of Percy cauteries in each year, the number of cases which have had a hysterectomy, and the number of cases in which no carcinoma could be demonstrated in tissues removed at the time the hysterectomy was done.

	Number of Cases	Number Having Hysterectomy	Number Can- cer Not Found
From February 1st, 1914	24	5	4
1915	54	15	9
To July 1st, 1916	22	6	6
Totals,	100	26	19

Of the 7 cases in which carcinoma was found at the second operation, it was known to be present in 5 cases at the time the hysterectomy was advised. But it was thought that owing to the great improvement which had occurred the total hysterectomy was advisable. In other words, they had been removed from an inoperable class to one that was operable. It cannot be inferred that merely because carcinoma could not be demonstrated in these 19 cases that they were not going to have a recurrence. One patient of these nineteen has already had a recurrence and died, and we will be unable to say how many more are going to do the same until sufficient time has elapsed.

The usual time selected for performing the hysterectomy has been at the end of four weeks after the cauterization. This permits time for all the burned tissue to slough away. In case a fistula occurs we do not attempt a later hysterectomy. At the end of four weeks there is very little discharge, if any, and the patient has regained sufficient strength so that the hysterectomy may be safely attempted.

In many of our cases we have waited longer than one month to do the hysterectomy. One case has been done ten months after the cautery and no carcinoma found. Two have been done at seven months and another four months later and no carcinoma found in

the tissues removed at the time of the hysterectomy. A few have been done at two and three months, but for the greater number the second operation has been done at the end of the first month.

I do not believe that a thorough cauterization can be done without opening the abdomen. During the first year that the Percy cautery was used we were not convinced of the truth of the above statement, and during that year there were 25 cases cauterized in which the abdomen was not opened. Five of these 25 cases later had a hysterectomy performed and carcinoma was reported present by the pathologist in all 5 cases. This simply shows that without a guiding hand in the pelvis to control the uterus and the tissue around the cervix, you cannot make sure the value of the cauterization. No case is classed as a Percy cautery unless the abdomen is opened and the uterus held during the cauterization. One may excuse himself by thinking that the case is in too poor a general condition to open the abdomen. Then the case had better be left alone. Or again you may say that this is to be only a palliative treatment, and it is not necessary to open the abdomen to burn off the mass of the growth. No palliation can come to the patient from the cauterization unless that cauterization is carried down to healthy tissue.

Regarding the statement that carcinoma cells are killed by a lower degree of heat than normal connective-tissue cells, I believe the great difference is in the type of cell. The carcinoma cell is of epithelial origin, and in burns of the first degree it is always the epithelial cell that is destroyed. The connective-tissue framework may withstand such a degree of heat.

I am not convinced that the entire pelvis of a patient may be heated to the point with the Percy cautery whereby carcinomatous tissue more than 3 cm. away from the cautery point can be destroyed. I do not believe that in those cases where there is glandular involvement in glands, which are situated at the bifurcation of the iliacs or in the outermost portion of the broad ligaments, that such a case can be cured by the Percy cautery. If there is truly glandular involvement there is little hope of cure by any means. But I do believe that if the growth is localized to the cervix or has not extended out into the broad ligaments more than 1 or 2 cm. there is good chance of cure by a thorough, careful cauterization.

There has been much discussion about the degrees of heat that should be employed. I would like to warn the profession that there is a greater danger in using an iron that is too cold than in using one that is too hot. When anyone states that he has used the Percy cautery for an hour and a half or two hours, I am forced to believe that the iron was a 'cold iron.' The average length of time of cauterization in the 19 cases in which 'no carcinoma' was found at hysterectomy, was forty minutes.

I believe the iron should be hot enough so that you can very plainly hear the tissue fry, and frequently get the odor of the smoke or burning tissue. We do not use a red-hot iron, but I am convinced it is much hotter than is being used by many others who are doing the regular 'Percy Cautery.'

In those cases in which we failed to kill the carcinoma as shown by hysterectomy, on examination of the tissues removed I was impressed with one thing in particular. Two of the specimens showed the carcinoma present just at the internal os of the cervix. In many of the earlier cases the cauterization was not always carried to the fundus of the uterus, and finding the carcinoma present at the internal os has taught us the value of this part of the original technique as was emphasized.

Regarding the classification of the cases which we have treated with the Percy cautery, I should explain that all cases of carcinoma of the cervix which are operated are classed on a basis of four, according to the extension of the disease. Those cases in class one are very early cases having a growth or an ulceration limited to only a part of the cervix and not extending on to the vaginal walls, which when examined and felt by the examining hand from within the pelvis through the abdominal incision would show very slight thickening at the cervix. In these very early cases we open the abdomen and thoroughly cauterize the growth with a hot iron for ten or fifteen minutes and follow this cautery by immediate total abdominal hysterectomy. There is only one such case classed in this group of 19 cases.

Cases of the second degree of extent include those cases in which the disease is limited to the cervix and where the disease is still confined to an involvement of the tissue of the uterus. In this type of case the uterus is still freely movable. The second degree case may also include some cases of cauliflower carcinoma which protrude from the cervix and often almost completely fill the vagina. When this cauliflower mass is removed, the cervix may not be extensively involved and the uterus may be freely movable. Regarding the cases in group two, it is probable that in the future a large percentage will have an immediate hysterectomy following the cauterization.

Cases of the third degree include those cases where there is slight fixation of the uterus, where the disease has destroyed the cervix to such an extent that it cannot be outlined and in which the carcinoma extends on to the vaginal wall. There may be extension out into the broad ligaments for 2 or 3 cm., but it does not include cases with extensive involvement of the broad ligaments and with glandular involvement.

There is another type of cervical carcinoma which we group in class three, and that is the type with an ulcerating cervix where



the vault of the vagina contracts and the uterine secretions become retained and pyometritis results. The uterus in such a case is often thin-walled and distended to the size of a three months' pregnancy or larger and filled with a foul smelling, mucopurulent liquid. The carcinoma which causes this condition is really of the ulcerating type and the disease is very often more extensive than it appears from vaginal examination.

Cases of the fourth degree would include all cases of carcinoma of the cervix with marked fixation of the uterus in which there is extension of the disease out into one or both broad ligaments with an extension of the local disease at the cervix well out on the vaginal walls, and the cervix entirely destroyed. Many of these cases will show glandular involvement and a few metastatic liver involvements. Liver involvement comes very late in these cases. We have seen but 3 cases with metastatic nodules in the liver, and in no case would it have been possible to have cured the local disease by cauterization.

Fifty-three of the 100 cases in which we have used the Percy cautery are found in class four, and the possibility of ever being able to do a later hysterectomy was not considered at the time the Percy cautery was done. Cauterization was done in these 53 cases merely for the palliation which follows its use. It gives, in about 80 per cent. of such cases, from nine months to one and a half years of freedom from symptoms. All the cases which have had a secondary hysterectomy have come from classes one, two and three; 14 cases were classed as third degree and 11 as second degree cases, and 1 as first degree.

Formerly we would not have considered operating on cases of the third degree to do a primary hysterectomy. Following the use of the Percy cautery these cases very frequently clear up to such an extent that they are good operative risks from the standpoint of being able to get well beyond any evidence of the disease.

One of the great values of the Percy cautery has been in the development of a method of technique by the use of proper instruments where the cauterization is not carried on blindly, but under the control of both the sense of touch and sight, and if done with sufficient heat will often entirely destroy all evidence of pre-existing carcinoma.

After all, heat is our greatest sterilizing agent. Hippocrates aptly said: "Things which cannot be cured by steel can often be cured by fire." That high degrees of heat do have a destructive action upon cancer tissue cannot be doubted. Experimentally, it has been shown that mouse carcinoma cannot be transplanted after the transplants have been heated above 113.5° F. On the other hand, connective-tissue will live after it has been subjected to a heat of 140° F.

Clinically we have frequently seen a carcinoma of the face apparently almost killed by an attack of erysipelas. Who can deny that the temperature of high degrees does not play an important part in such a process?

It is a well known fact that where Coley's serum is given for sarcoma, the patient receives little benefit unless there is a marked temperature reaction. And this is true of many of the serums and antitoxins used in the prevention or treatment of disease.

All bacterial life grows best at body temperature or 98.6° F. If your incubator is raised to 104° the cultures do not grow nearly as well and many of them will soon die out. The patient, who reacts well in pneumonia and has a high temperature with his rapid pulse, usually combats the infection successfully. But the patient who has a rapid, thready pulse and a low or subnormal temperature is always the one to be worried about. There is but little doubt in the minds of those men who have made a life study of the matter, that all cancer is closely associated with some form of bacterial life which we have not yet been able to study because we do not know the methods of staining or isolating the organism producing it.

For many years we did not know the cause of tuberculosis, and then came Koch with his acid-fast stain and now the method for demonstrating under the microscope the tubercle bacillus is almost common knowledge. In tuberculosis we have found that the heat rays of the sun have a very deleterious influence upon the life of the germs.

Cancer is affected by the rays of radium, and I should say that the effects of a thorough, careful cauterization and large doses of radium are very similar. I have seen remarkable results follow both methods of treatment. I think the depth to which the carcinomatous tissue can be killed compares about equally. It may be said that radium is the safer and less painful of the two methods. Both methods are dangerous in unskilled hands. Heat is the more practicable because it is cheaper and always can be obtained from any electric light current or by the use of the common soldering iron.

I do not believe, as some have advocated, that the Percy cautery is a great 'cure-all' for carcinoma of the cervix, but it has helped us to realize the value of thorough sterilization of the new growth and the tissues in close proximity to it before attempting any surgical removal.

## RADIUM IN GYNECOLOGY.

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Radium may be applied to benign and malignant diseases of the female pelvic organs. The benign disorders are the myomata uteri, the hemorrhagic metropathies and chronic endometritides and cervicitides, the malignant, the carcinomata, chorionepitheliomata and sarcomata. I shall discuss in the following chapter the underlying principles and indications of actinotherapy in each of the diseases enumerated.

## MYOMATA UTERI.

The cardinal symptoms of the benign uterine connective-tissue tumors are hemorrhage, discharge and pain. The hemorrhage is due to the pathological changes in the uterus and the ovaries. The ovaries cause monthly uterine hemorrhages, *i. e.*, menorrhagias, if they increase the output or intensity of their hormone. Such hyperfunction is due to the pelvic congestion usually found associated with any mass or tumor within the true pelvis or results from the small cystic degeneration of the ovaries so often present with myomata uteri. The hemorrhages are of uterine origin if a chronic hypertrophic and hyperplastic endometritis has resulted from the pressure of an intramural or submucous fibroid. A subserous pedunculated myoma rarely causes menorrhagia. The chronic endometritis and a general pelvic congestion are also responsible for the profuse leucorrhea so often found in myomatous disease of the uterus. Another causative factor is sought to be the noncontractibility or loss of contractibility of the myometrium and an elastoid degeneration of the uterine blood-vessels. Pain is either due to pressure and limitation of space or it is dysmenorrheic. Pressure pain is characterized by a sense of weight and fullness in the pelvis and often accompanied by mechanical obstruction of either the rectum or the urinary organs. The dysmenorrhea is either ovarian, when due to the small cystic degeneration of the ovaries, or uterine when caused by the menorrhagia and formation of coagulæ, the expulsion of which is frequently associated with intermittent and bearing down pains.

The three cardinal symptoms, hemorrhage, discharge and pain increase suddenly and alarmingly if a degeneration of a myoma occurs. It does not matter whether the degeneration is malignant



or benign. With the aggravation in symptoms, also occurs a rapid growth of the tumor or tumors.

These clinical observations assist us in determining the mode of action a remedy should possess for a successful treatment of this condition. A fibroid not causing any symptoms does not need any medical interference, a bleeding fibroid demands arrest of hemorrhages and a tumor, causing pressure pains, or undergoing degeneration, surgical removal.

It is obvious that if menstruation would cease, the intensity of the hemorrhage would decrease, or the bleeding entirely subside. Radium acts as Nature's curette and hemostatic when applied to the endometrium. The destruction of endometrium by radium rays may be partial or total, depending on the mode of application and on the age and sexual status or vigor of the patient. If the endometrium is totally destroyed, amenorrhea results, if only partially, an oligomenorrhea. In other words, the application of radium in the young to destroy endometrium requires large massive doses from 2,000 to 3,000 mgrm. hours of gamma rays. The same result may be obtained in a woman approaching the menopause, or who is thirty-five years or over in age with only a third or fourth amount of milligram hours. The latter applied in the young and sexually vigorous person would only result in a decrease, *i. e.*, the re-establishment of a normal menstruation or at most an oligomenorrhea. Total destruction of the endometrium leads to a cessation of the leucorrhea, while partial ablation of endometrial tissue results in a decrease in the amount of mucous secretion. In other words, it is entirely within our means to destroy the endometrium either partially or totally and thereby ameliorate the uterine hemorrhages or cause a cessation of menstrual life, *i. e.*, a premature climacteric.

A myomatous tumor causing pressure pain or undergoing degeneration must be removed surgically. It would be criminal to procrastinate affairs by an attempt at radiation which under such circumstances cannot benefit the patient or influence the tumor. Should a patient with myomatous tumors, however, have general contraindications to surgical interference, as a brown degeneration of the myocardium, chronic Bright's disease, diabetes, tuberculosis and so forth, then the application of radium would become indicated.

Whether the tumor subsides in the course of time is an open question. I have observed many patients in whom the tumor gradually disappeared within six to nine months. A thorough curettage of the endometrium must precede the application of radium under all conditions, to exclude the possibility of overlooking a coexisting carcinoma.

The objection to radiotherapy of bleeding myomata raised by surgeons (Deaver,<sup>1</sup> Tracy<sup>2</sup>) on account of the frequency of occur-

rence of degeneration is obviously untenable. The purpose of medical and surgical treatment is to save life and prevent chronic invalidism. It is wrong to argue that if such and such disease might occur at some future time or such and such a degeneration occur in a benign condition, we would forestall the forces of the causation of disease or degeneration by the removal of such organs or localities. Indeed, the human body would be unrecognizable after a surgeon would have applied such principles to a submissive clientele.

The indications for the treatment of myomata uteri are: Myomata of the cervical, submucous and pedunculated varieties, degenerating fibroids, and tumors causing pressure must be removed surgically. Women below thirty-five years of age, desiring offspring, are myomectomized. All other myomata causing symptoms are subjected to radium treatment, which invariably causes a cure, primary as well as remote.

#### HEMORRHAGIC METROPATHIES.

Essential uterine hemorrhages result from functional derangements of the menstrual apparatus. These are disturbances in the interrelation of the ductless or endocrinal glands. Predisposing factors are chronic hypertrophy of the endo- or myometrium, hyaline degeneration of the tunica media of the uterine blood-vessels, whereby their contractibility is lost, chronic congestion or stasis of the pelvic organs and so forth. The hyaline degeneration is a remnant of a rather imperfect involution following the termination of gestation. Chronic stasis of the pelvic organs results from occupations that require continuous sitting postures, obstinate and long-continued constipation, sexual perversions and so forth.

Disturbances of the internal secretion of the ovaries, *i. e.*, ovarian disfunction, either hyper- or hypofunctional, are frequent at the beginning and termination of the menstrual life. They need not worry us if occurring at the time of puberty. The institution of correct hygienic and therapeutic measures will soon ameliorate the disturbances and finally lead to normal menses. Hemorrhages appearing near or at the termination of menstrual life require an entirely different interpretation. The climacteric uterine hemorrhages, in fact all uterine hemorrhages, occurring during the child-bearing, climacteric and senile periods of women, must be regarded as due to malignant disease unless otherwise proved. The only positive means for a correct diagnosis, if the clinical picture is not clear, is offered by the microscope. Hence it is criminal to treat a woman suffering from a uterine hemorrhage without first making a positive diagnosis. If the microscopic examination of endometrium and cervical tissue excludes malignancy, and a careful bimanual examination does not reveal another pathology in the pelvis,

and a scrupulously detailed general examination of the patient excludes an extragenital disease that might cause uterine hemorrhages, then the diagnosis of an essential, primary functional uterine hemorrhage is clear. If a hemorrhagic metropathy does not readily yield to the usual treatment, medicinal and mechanical or internal and local, then the application of radium is indicated, which invariably effects a cure. The *modus operandi* has been discussed in the preceding paragraph.

#### CHRONIC ENDOMETRITIS AND CERVICITIS.

The specific symptom of these inflammations is a leucorrhea. Menorrhagias, dysmenorrhea and burning aches or pains in the deep of the pelvis may or may not be present. The leucorrhea is usually an expression of the hyperplasia and hypertrophy of the mucous glands and proliferation of the surface epithelium of the endometrium and endocervicum. These are caused either by infections or chronic stasis. The diagnosis of such a condition might be difficult or incorrect unless the diagnostic abrasio is performed during the period of the post-menstrual reconstruction of the endometrium. The hyperplastic endometritis is said to be of an infectious origin if plasma cells are found on examination of properly stained microscopic sections.

The customary treatment in the absence of adnexal disease is a curettage, followed by the application of caustics, such as iodine, iron-chloride, silver nitrate, carbolic acid, zinc chloride, formalin, a Beck's paste tampon, atmocausis and zestmocausis. The patient, following this treatment, seems to be entirely relieved of the leucorrhea. A recurrence soon occurs and within four to six months the patient is as bad as ever, and usually drifts into the hands of another practitioner who may repeat the same maneuvers or advise removal of the uterus.

Chronic endometritis and cervicitis which prove refractory towards the usual treatment should be subjected to applications of radium. Its action may be controlled, thus curing leucorrhea and preserving the menstrual function and often also potency. The action of the remedy is readily understood by referring to its action discussed under *myomata uteri*.

#### CARCINOMA UTERI.

The success of the treatment of all malignant diseases of the uterus wholly depends on its early recognition, because the disease, in the beginning, is localized or strictly confined within the organ. The treatment must be surgical. Any other form of treatment would be out of question, unless surgery is contraindicated on account of some physical or constitutional defect of the patient. This



principle applies to carcinoma, chorion-epithelioma and sarcoma of the uterus.

Early recognition of malignancy of the genital organs is possible only if the patient is able to interpret intelligently her symptoms. This she may do if physicians will undertake to instruct their patients about the importance and significance of uterine hemorrhages, discharges, pain, loss of weight and strength, and point to the necessity of an immediate, complete and careful physical examination. The medical men, on the other hand, should endeavor to make the most careful and painstaking examination when the patient applies to him on account of the symptoms enumerated and render an efficient and correct diagnosis. The poor results obtained in the treatment of malignant disease in any part of the human body are due to the indolence of the public and the neglect and the indifference of the physician. Publicity in journals and newspapers would tend to correct this unfortunate state of affairs concerning the cancer question.

A localized malignant disease of the uterus demands an extended abdominal panhysterectomy preceded by a vaginal cauterization of the uterus. No other treatment will assure the same success to physician and patient. Should the disease have invaded neighboring organs and tissues as the para- and perimetrii, the bladder and rectum, ureter and bowels and so forth, it must be determined whether the cancer may still be eradicated by an operation. If operable, the same procedure must be applied as for the localized cancer. Results, of course, are very poor.

Inoperable cancers are hopeless and incurable, yet proper palliative measures may be used which will apparently restore the patient's state of health to normal and often also cause a local healing of the affected organs. It is only a question of time, when a recurrence or relapse takes place. The patient may again respond to palliative measures and obtain another respite from her eventual fate. Finally, death will relieve the doomed sufferer from her pitiful existence.

Palliative measures are varied, both as to kind and effect. Such remedies are excochleation, cauterization as Percy's method, the application of 50 per cent. alcoholic solutions of zinc chloride, Gellhorn's acetone treatment, the massive roentgen rays as advocated by Bumm,<sup>3</sup> and finally the gamma rays of radium and mesothorium. Having used all these measures carefully, patiently and extensively, I unhesitatingly state that radium is the best palliative remedial agent in this dreaded disease. It cannot be called curative until observations have extended over a space of time of five years. Radium restores the patient to a normal subjective condition and brings about a local healing of the organs in the majority of cases. Recurrences, however, take place within six, twelve, twenty-

four or thirty-six months and the patient succumbs to a general carcinomatosis. The patient, in the meantime, leads a useful life, regains her working ability and earning capacity. Should a recurrence take place, they seem to lose strength rapidly, apparently suffer little and seem to succumb in a short time. It is worth the effort to use the remedy.

I have demonstrated by an extensive microscopic examination of uteri treated with gamma rays of radium, that the rays destroy cancer or stimulate embryonic cells to develop to adult, highly differentiated cells. Bumm has proved that the extent of the action of the gamma ray radially is 2 to 4 cm. into the tissues. I have shown from experiments carried on in living tumor tissue that the gamma rays of 50 mgrm. radium element applied to an area of 2 square inches will destroy carcinoma within a depth of 1 cm. within twelve hours, within a depth of 2 cm. within forty-eight hours, and within a depth of 3 cm. within one hundred and eight hours. Why do patients treated according to these laws have recurrences or are not permanently cured. Evidently the carcinoma extended so far that the rays could not possibly destroy the growth in its entire extent. One might say that a longer continued application, or the use of larger amounts of radium, or the use of artificial canals dug into the tumor mass to admit the radium carrier, might have brought about a cure. The gamma rays of 50 mgrm. of radium element will cause a burn of first degree of the superficial layers of the skin or mucosa after an exposure of six hours, a second degree burn after an eight-hour exposure, and a third degree burn and sloughing of tissue after a twelve-hour exposure. The extent of the latter burn depends entirely upon the duration of the exposures. The longer the application of the rays to the tissues is, the deeper will be the destruction of the tissue. These facts place an absolute and definite limit on the time exposure and amount of radium that we might safely use. The knife is limited in its usefulness and the gamma rays likewise, although the extent of the action of the latter surpasses that of the former. The conclusion must be drawn that the earlier a case comes for treatment, the better the results will be. Whether radium can cure cancer will be demonstrated within another year or two, when clinical observations will have passed the critical time period of five years.

Another usefulness for the gamma rays of radium consists in the possibility of its use after radical extirpation to prevent recurrences. Nests of carcinoma cells may have soiled the field of operation, and by inoculation result in a new growth. Or the apices of the cones or roots of cancer cells may have been left behind. The application of radium to the wound surface after a hysterectomy would effectually kill such parasites.

The recurrences after radium treatment usually take place in the

base of the parametria and in the glands along the hypogastric and iliac blood-vessels. They may be readily palpated through the rectum. I have repeatedly treated such recurrences, per rectum, by the combined method, *i. e.*, radium per rectum and massive x-rays through the anterior abdominal wall. A temporary improvement results. However, the rectum is so sensitive to the rays that effectual radiations are out of the question. This coincides with the results which we obtain in the ray treatment of rectal cancers. Prolonged and massive rayings per rectum cannot be borne by the patient. They cause unbearable and obstinate tenesmus, mucous-like diarrheal stools, and profuse serous discharges which may last from six to eight weeks in spite of every medical attention.

Radium therapy has not as yet been completely developed. It will require years and years of careful observation and close study by the clinician and physicist to perfect the therapy. The application of the radium is an art. It can only be acquired by the most painstaking observation and close application. In the hands of the uninitiated, radium is directly dangerous. The pioneers of the roentgen ray workers lost their lives or were crippled on account of the fact that its dangers were not known. Many a patient succumbed to roentgen ray cancer because the therapist did not know the perfect technique as used at present. So it is with radium. The rays are wonderfully controllable if one only knows how to use them. They are terribly destructive, if not held within bounds.

At present we may claim that the radium rays will cause 100 per cent. cures, immediate and remote, in myomata uteri, hemorrhagic metropathies and chronic endometritides and cervicitides, if the indications as given above are scrupulously followed. In carcinoma uteri the use of radium is indicated as a prophylactic after radical extirpation when it will increase the efficacy of the surgical procedure. It is indicated in operable carcinomata if constitutional contraindications to surgery exist. It is a specific as a palliative in inoperable cancers, when it will cause an apparent cure in 35 per cent. of the cases and a subjective improvement in an additional 16 per cent.

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## THE DANGER SIGNALS OF TUBAL PREGNANCY.

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Of the acute intra-abdominal conditions that may suddenly bring the patient to the point of death, tubal pregnancy is one of the most insidious. It may exist for weeks without any marked sign, and when troublesome symptoms do appear, often they are not distinctive enough to attract attention unless the physician happens to have that condition especially in mind. In fact, so far from leading to recognition of the trouble, the symptoms not infrequently lead to the adoption of therapeutic measures which still further put the patient's life in jeopardy. I refer particularly to curettage and examination under anesthesia. In certain cases the onset of serious symptoms has followed immediately the use of one or the other of these measures.

In practically all of these cases the disastrous internal hemorrhage is preceded for some days or weeks by certain minor signs. These minor signs or symptoms are not important from the standpoint of disability, but they are very important from the standpoint of underlying cause and possible future developments. They correspond to the danger signals beside a railroad. If the engineer of the limited express runs past the signals without recognition, a catastrophe may occur at any moment.

What are the warning signs of tubal pregnancy? There are two which I wish to emphasize here. First, bloody discharge and pelvic pain following a missed menstruation, and, second, persistent pelvic inflammatory symptoms without corresponding fever.

1. SOME BLOODY DISCHARGE AND PELVIC PAIN FOLLOWING A MISSED MENSTRUATION.

The patient may have gone over time only a few days, in which case the bloody discharge is considered simply a delayed menstruation. The menstruation may have been missed for two weeks or for several weeks, in which case the bloody discharge, accompanied with pains and clots and sometimes shreds of membrane, is considered a miscarriage.

In the cases simulating miscarriage the clinical picture is often very deceptive—so deceptive that many such cases have been treated for miscarriage, even to the extent of employing measures that caused rupture of the tubal pregnancy and brought the patient near to death.

The close resemblance to early abortion and the ease with which a mistaken diagnosis may be made, is illustrated by the following cases.

CASE I.—Mrs. C., *æt.* thirty-seven, one child seven years before. I was called to the town, some distance from St. Louis, to do a curettage following a miscarriage. The patient had missed the menstruation for a month and then had pains with the passage of clots and membrane. The bleeding and irregular pain had persisted, and the physician felt that there were retained remnants and advised curettage for the same. The patient, who before her marriage had been Superintendent of Nurses in one of the St. Louis hospitals, was uneasy as to the danger of sepsis and requested that I be called in consultation to do the curettement. Accordingly I was called, the physician explaining over the telephone what the condition was and what was needed.

After I had examined the patient and we had gone over the case carefully, I was not enthusiastic about curettage. In addition to the bloody discharge and the enlarged and softened uterus, there was a very tender mass in the adnexal region of one side. To determine if the mass might be an old one, the patient was closely questioned, but no evidence of pelvic disease in recent years could be elicited. Furthermore, the mass was too tender to be of long standing. It presented the acute tenderness of recent inflammation or hemorrhage. Of course, an acute adnexal inflammation with exudate is often found following a miscarriage with infection. With such extensive infection, however, there should be marked fever. There had been no such fever in this case—the temperature had ranged from 99° to 101° F. In spite of the attacks of pelvic pain, some of which were very severe and left the patient sore for several days, the temperature had at no time gone above 101° F., and most of the time had been around 100° F.

Taking the various symptoms into consideration, I made a diagnosis of tubal pregnancy, with repeated slight hemorrhages—enough to cause pain but not enough to affect the pulse. I advised that the patient be put on a stretcher and brought to the hospital for operation, care being taken that she remain absolutely recumbent and quiet all the way. This was done, and when I opened the abdomen the diagnosis was confirmed. The pregnant tube was surrounded by a mass composed of blood clots and fibrinous exudate. The pathological structures were removed and the patient made a prompt recovery.

CASE II.—Mrs. C., *æt.* twenty-seven, one child sixteen months before; no other pregnancy. The latter part of July, 1915, the patient menstruated at about the right time, but the flow was not normal. It dragged along as a bloody discharge for several weeks, and there were irregular pains. The physician supposed that the patient had had an early miscarriage. As the discharge and disturbance persisted in spite of conservative treatment, continued until the latter part of August, he decided to curette to remove the retained remnants. He did so, and under anesthesia he found that he could outline a mass in the left side of the pelvis, evidently of adnexal origin. Instead of improvement following the curettage, the patient became worse. There was more pain and the mass increased in size. It was assumed that the miscarriage had been followed by a mild infection which had extended to the adnexa, and that this had been aggravated rather than helped by the curettage. The physician, who was conscientious and much troubled about the matter, remarked to me when I was called later, that the patient's serious symptoms dated from the anesthesia and curettage. There had not been the fever that is ordinarily present in extensive infection, but the process all the way through had seemed mild and only subacute. In the ten days following the curettage the symptoms continued in an irregular way, with encourag-

ing remissions and discouraging exacerbations. At the end of that time, there still being no decided improvement, the physician began to suspect something out of the ordinary and asked me to see the patient. By that time there was a large tender mass in the left lower abdomen and pelvis. The mass had increased in size rather rapidly since the curettage. The absence of decided fever, such as would accompany an acute inflammatory mass of this size, indicated that the mass was blood clots rather than inflammatory exudate, and the patient's condition indicated blood loss. The diagnosis of tubal pregnancy having been decided on, the patient was taken to the hospital for operation, due care being exercised that she be kept perfectly recumbent and quiet in the preparation for the trip and during the trip to the hospital. She stood the trip without disturbance. At the operation, considerable free blood was found in the abdomen, in addition to the large mass of blood clots about the pregnant tube. The patient was in good condition all the time and recovered without particular incident.

CASE III.—Mrs. S., *æt.* thirty-seven, three children, the last seven years ago. A miscarriage three years ago. In August, 1915, the menstruation was missed. There was nausea and the usual breast disturbance of early pregnancy. The patient was opposed to another pregnancy and had an instrumental attempt at abortion made September 11th. She stated that only a little bleeding followed, no embryo or membranes were seen. Following this the patient had considerable recurring pain and soreness and became alarmed and sent for her family physician. She confessed to the attempt at abortion and promised that no further effort in that direction would be made. The physician put her on a sedative treatment to preserve the pregnancy if possible. The uterus was enlarged and softened. There was an adnexal mass beside the uterus, but the patient had had a very severe adnexal inflammation two years before and symptoms of it had persisted off and on ever since. Her pains were supposed to be due to the stirring up of the old inflammatory lesion by the congestion and irritation of the advancing pregnancy. As the pains persisted, it became a question whether it would not be necessary to operate for the inflammatory lesion. The family physician asked for consultation and at the request of the family called a general surgeon with whom they were acquainted. At the consultation it was decided to send the patient to the hospital, to secure the rest and nursing needed. Under absolute rest the pain and soreness diminished and the bloody discharge ceased. The patient became so much better that it was hoped that the pregnancy might go on, and the patient returned to her home. Soon after returning home, however, as she began to stir around, pain returned and also some bleeding with clots and membrane. The physician then decided that the embryo had probably been expelled before he saw her and that there were retained membranes causing the persistent bleeding and pain. Accordingly, he curetted. During the curettage the patient seemed weak and as soon as she recovered sufficiently from the anesthesia, she complained of intense pain in the abdomen and began vomiting. The vomiting and the outery with pain kept up incessantly. It was diminished by morphine but not stopped. By the next morning the patient's condition was very serious. The pain and vomiting were still present, there was marked distension of the abdomen and the pulse was growing weak. Repeated attempts to secure bowel movement had little effect on the abdominal distension and only served to increase the pain.

I was called in consultation about noon. She was then in an extremely serious condition. There was constant vomiting and restlessness from pain in spite of morphine in large doses. The abdomen was greatly distended and the pulse was weak and rapid. The facial expression was that pinched and blanched 'abdominal facies' so common in severe abdominal shock. The



diagnosis lay between ruptured tubal pregnancy and acute perforative peritonitis, from the perforation of an infected uterus with the curet or the bursting of a pus pocket during the manipulation under anesthesia. The paralytic ileus and persistent vomiting might have come from any one of these conditions. The history of low temperature indicated tubal pregnancy and that diagnosis was made. Whatever the lesion, however, it was evident that the patient's only hope lay in prompt operation. Accordingly, she was removed to the hospital and the abdomen opened. There was much free blood around the uterus. There was a tubal pregnancy in the right side, with a three months' fetus. This corresponded to the time of supposed pregnancy (missed menses in August and operated November 1st). The mass, containing the tube, fetus, membranes and blood clots, was quickly removed, a rapid search made for any point of intestinal obstruction, and then the abdomen closed. The patient was in as good condition at the close of the operation as before it was begun, in fact, the pulse was somewhat better as the short etherization seemed to act as a stimulant. Instead of improving after operation, however, as was hoped, the heart soon began to fail as before. The long continued strain of the vomiting and pain in addition to the severe hemorrhage had evidently exhausted all the reserve power and the patient died that night.

CASE IV.—Mrs. H., *æt.* thirty-three, one child ten years before, no other pregnancy. I saw the patient in consultation with the family physician at the hospital February 14th, 1915. The patient had been regular in menstruation up to the preceding December, when she went over time. Menstruation should have started about the first of December but did not. December 10th a slight flow began and continued until the 19th, when the patient was seized with sudden severe pain in the middle of the night. This lasted three hours and was followed by soreness which gradually subsided. She had another such attack December 25th, and several others during January. There was an irregular bloody discharge during this time and a mass developed back of the uterus. The physician assumed that there had been a miscarriage with infection and resulting salpingitis and exudate extending into the cul-de-sac. As the symptoms persisted in spite of palliative measures, continued until the latter part of January, the physician decided to open into the supposed inflammatory mass back of the uterus and evacuate the contained pus. Accordingly, the patient was sent to a hospital where the physician did a posterior vaginal section. Some dark blood escaped. No pus was found, but it was hoped that benefit might result from the drainage of the inflammatory area. There had been only slight fever and it was assumed that the inflammatory process was mild. The mildness all disappeared, however, after the vaginal-drainage operation. The patient's pains increased and the temperature ran up high within a few days and the small amount of discharge from the vaginal drainage tube changed from blood to pus. A rapidly enlarging mass appeared, filling the pelvis and lower abdomen. The temperature continued high and the patient's strength began to fail. I saw her in consultation about ten days after the vaginal drainage operation. She was then in a very serious condition and it was a question whether she could stand operation, and whether, if she did stand it, it would check the extending inflammatory process. When I opened the abdomen I found a large collection of foul smelling pus, more or less encapsulated by adherent intestinal coils. On the left side were remains of a ruptured tubal pregnancy. A rapid excision of the damaged adnexa was made and the abdomen closed with free drainage, both by abdomen and vagina. The patient had a stormy convalescence but eventually recovered.

Considering in a general way the symptoms of missed menstruation succeeded by pains and bleeding as seen in the above cases,

one very naturally thinks first of miscarriage, and properly so, for that is the cause of such a symptom-complex in nine cases out of ten. But in the tenth case miscarriage is not the cause, and the problem is to handle all ten cases in such a way that the danger signals of the special case will be picked up before there is serious damage. How can that be done? It can be done by keeping the possibility of tubal pregnancy in mind in every case until the fact of ordinary miscarriage has been positively established. Blood clots and shreds of membrane do not establish the fact of a miscarriage. Blood clots and shreds of membrane are frequently present in the discharge in tubal pregnancy. Miscarriage can be established with certainty only by finding the embryo or sac among the blood clots, or by a microscopic examination showing chorionic villi. Of course in some cases of miscarriage, the embryo and membranes have passed before the physician is called and have not been saved for his inspection. In such a case the possibility of tubal pregnancy must be kept in mind until the subsequent course of the case proves its absence. In some cases the pelvic examination at the time will enable one to exclude all painful abnormalities in the adnexal region. But in a certain proportion of cases, deep pelvic palpation can not be carried out satisfactorily, and an element of uncertainty must remain for some time. Considering the other side of the question, a painful mass beside the uterus with missed menstruation and pain and bleeding, does not necessarily mean tubal pregnancy. Such a mass may be a chronic inflammatory mass or tumor of long standing. In this connection the pelvic findings at a previous examination are of much importance. Even a mass of recent development does not necessarily mean tubal pregnancy, for such a mass may be caused by mild infection from a miscarriage extending to the adnexa. Under all these circumstances, however, the possibility of tubal pregnancy must be kept in mind and must stand as a warning against any extreme manipulation of the parts.

## 2. PERSISTENT PELVIC INFLAMMATORY SYMPTOMS WITHOUT CORRESPONDING FEVER.

When a patient is confined to bed for some days with pelvic pain and tenderness in the lower abdomen and examination reveals a tender fixed mass in the adnexal region, we naturally think of ordinary pelvic inflammation. In the vast majority of cases, ordinary pelvic inflammation would be found to be the cause of such a group of symptoms. There are certain exceptional cases, however, in which these common symptoms are due to an uncommon lesion.

This point is illustrated by the following cases.

CASE I.—Mrs. W., *æt.* twenty-eight, one child five years ago. This patient lived in a neighboring town and was brought to my office by her physician, who had been treating her for several weeks for an inflammatory pelvic mass. The

inflammatory symptoms would subside very well at times, but refused to stay subsided. The history was as follows: Three months previously the patient had missed the menstruation for two weeks and then began to bleed and had a miscarriage (embryo not seen). She seemed to get over this very well, except that bloody discharge recurred frequently and there were periods of pain and soreness during which she would have to lie down. After a time the periods of pain became more marked and the physician found a mass beside the uterus. This was supposed to be an inflammatory mass and was treated accordingly. There was very little fever, and the pain and soreness would subside when the patient was kept quiet. When she stirred about for a while the pain and soreness would return. This alternating improvement and exacerbation under conservative treatment kept up for two months and finally the physician became convinced that something more would have to be done. Selecting a time when she was feeling best, he brought the patient to the city and to my office for examination and advice. After a consideration of the history and the examination findings, I told the doctor that I thought his patient had a tubal pregnancy. He was much astonished and rather incredulous that a patient could have such a serious trouble and still be up and around. However, he was ready to follow my advice and the patient was sent to the hospital for operation. When I opened the abdomen the next morning, a sac containing a three months' fetus was found in the right side of the pelvis. The wall of the sac was formed by the broken tube and the adherent intestines and adjacent uterus. There had been very little bleeding. The sac and affected adnexa were removed and the abdomen closed without drainage. The patient made a prompt recovery. The physician said to me that he had been practicing medicine for twenty years and that that was the first case of extra-uterine pregnancy he had seen. He remarked that if there had been other cases he had overlooked them, and that he was going to watch more closely in the future. Singularly enough, just six weeks later this same physician brought his wife to the hospital and asked me to see her, stating that he feared she had a tubal pregnancy. I saw her, agreed with his diagnosis and operated. There was free blood and clotted blood in the abdomen from a ruptured tubal pregnancy in the right side. The hemorrhage had been only moderate, the patient was in good condition and recovered promptly.

CASE II.—Mrs. W., *et. twenty-five*, one child two years before. No other pregnancy. The patient had a rather scanty menstruation at the usual time and then several days later began having pains and bloody discharge. The family physician was called and he found a small painful mass beside the uterus. The most common cause of such a group of symptoms being salpingitis that diagnosis was made and treatment given accordingly. The troublesome symptoms increased in spite of rest and sedatives, and the physician felt that the inflammatory mass was becoming serious in extent and sent the patient to the hospital. He tried to get me in consultation but could not at the time and so decided to examine the patient under anesthesia to determine more definitely the size and connections of the inflammatory mass. During the examination under anesthesia the pulse and color began to fail rapidly, and the physician then realized the nature of the trouble. When I saw the patient in consultation a little later, in response to a hurry call, she was in collapse, with dulness in the flanks indicating a large quantity of free fluid. We operated at once. The abdomen was nearly filled with fluid blood which had come from the rupture of an early tubal pregnancy. There were some old blood clots about the tube, showing that there had been some hemorrhage two or three days before. The patient recovered.

The clinical picture in this case was that of pain and metrorrhagia supposed to be due to salpingitis, and the examination under anesthesia, which



caused the serious hemorrhage, was for the purpose of determining the extent of the inflammatory mass.

The problem in this second class of cases is to differentiate the tubal pregnancy cases from the ordinary inflammatory cases. This is accomplished by keeping in mind the possibility of tubal pregnancy until such possibility is excluded by a definite diagnosis of inflammation based upon a critical study of the case.

What are the differential diagnostic points? First, the absence of fever to correspond with the apparent acute inflammatory mass. This should arouse suspicion that the mass is blood and not pus or inflammatory exudate. Second, the absence of an evident cause for the acute inflammation. There is no history of gonorrhea or abortion with infection. Third, the missed menstruation, which is usually found on careful inquiry. Fourth, the sudden onset of pain without evident cause, followed in a few days by bloody vaginal discharge. Fifth, the extreme tenderness of the mass on vaginal palpation. Sixth, exacerbation of pain without corresponding rise of temperature.

The point which I wish to strongly emphasize is the insidiousness with which this serious condition may progress and the ease with which it may be overlooked. All the physicians handling the cases reported, were good practitioners and some of them were exceptionally well up and alert on diagnosis, which fact only emphasizes the difficulties of diagnosis and the possibilities of oversight in these cases. The general surgeon who had the patient with tubal pregnancy under observation in the hospital and sent her home with it, is a first class man, a hard worker and a close observer generally, and yet he missed the condition—just the same as any of us may miss the condition if the possibility of it be not kept constantly in mind. His attention was so monopolized by the supposition of normal pregnancy with a complicating old adnexal inflammation, that the possibility of the trouble being tubal pregnancy did not occur to him. Much the same may be said of the other cases mentioned. The significance of the warning signs was not appreciated because the condition of tubal pregnancy was not thought of in making the diagnosis. The danger signals were passed without recognition.

## THE USE OF PITUITARY EXTRACT FOR THE INDUCTION OF LABOR.

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There seems to be much diversity of opinion regarding the efficacy of this preparation for initiating uterine contractions. Many statements are made which show some diversity of opinion.

In any consideration of this subject it seems best to subdivide the topic into the induction of abortion, premature labor and labor. It seems to be the common opinion that this medicament will not induce an abortion though I have personal knowledge of a case where an abortion, occurred following its use. It was administered for another purpose, the physician feeling secure in his belief that it could have no such action. It would seem that we should at least be cautious in its administration to pregnant women until we know more about it. I have had no personal experience with it for inducing therapeutic abortion, so will not consider this phase of its possible use.

There seems to be more diversity of opinion regarding its use for the bringing on of premature labor.

Trapl<sup>1</sup> states that it is not useful for the induction of abortion or premature labor. Herron<sup>2</sup> remarks that it is uncertain for inducing labor.

Rongy and Arluck<sup>3</sup> state that pituitrin does not induce labor pains.

Litzenberg<sup>4</sup> states "it will not usually produce an abortion. It will sometimes induce premature labor but is not reliable for that purpose."

None of the above authors seems to base his opinion on his own observation.

Stern<sup>5</sup> induced labor in a case of tuberculous laryngitis at thirty-six weeks, also in a case of nephritis at thirty-nine weeks, but failed in one at the eighth month.

Watson<sup>6</sup> was successful in one premature case at eight months with tuberculosis, in one at term and one post-mature.

Sachs<sup>7</sup> reported a case with rupture of the membranes at the seventh month in which he was not able to induce labor by the use of pituitrin.

Harrison<sup>8</sup> thinks it is not of much value in initiating premature labor, but thinks "as an addition to some mechanical methods, *e. g.*, *Champetier de Ribes* bag, it is of great value in bringing on pré-

mature labor or abortion. In the former case it may be sufficient in itself, but there is some risk of tetanus of the cervix or of the uterus, especially when repeated injections are required."

Fries<sup>9</sup> reported 2 cases of threatened eclampsia, one at thirty-six weeks, the other at thirty-eight, in which labor was induced by repeated injections of pituitrin in 1 c.cm. doses. He also mentioned 2 cases in which labor was induced at term by the same method.

Schaefer<sup>10</sup> reported 2 cases in which the fetus was dead where he succeeded in bringing on labor by repeated injections of pituitrin. He failed to induce labor in one case in the ninth month of gestation. His experience led him to conclude that pituitary extract is not useful for the induction of abortion or premature labor.

Hirsch<sup>11</sup> made the following statement based on his experience with a number of cases. "It is not possible to induce an abortion or premature labor with pituitrin alone. It can, however, strengthen the pains which have been excited by a metreurynter or tamponade of the cervix."

Vogt<sup>12</sup> reported 7 cases of the induction of premature labor by the use of pituitrin and the bag with good results.

Madill and Allan<sup>13</sup> induced labor in one case at seven months by the injection of 2 c.cm. of pituitrin.

Lindeman<sup>14</sup> gave an account of 4 cases in 3 of which pains were started by the injection of pituitrin. Two of these ended in spontaneous delivery. In the other 2 it was necessary to introduce Vorhees bags. He concluded: "It is of value occasionally for the induction of labor at or near term."

Seeley<sup>15</sup> reported 12 cases at or near term in which he failed to induce labor by the use of pituitrin in all except one.

Stolper<sup>16</sup> cited 2 cases which were about two weeks overdue, in both of which he induced labor with irregularly repeated doses of pituitrin.

Hamm<sup>17</sup> based his conclusion on a study of 10 cases before term. He decided that pituitrin was of little use in a resting uterus unless accompanied with rupture of the membranes or the introduction of a bag.

Bell<sup>18</sup> suggested the preliminary sensitizing of the uterus with pituitary extract and its use in combination with mechanical means. "With regard to the induction of labor, it has been shown by several observers that it is rarely possible to induce abortion or labor by the use of infundibulin alone; this is especially so the earlier the attempt is made. Occasionally at full term labor may be precipitated by the administration of infundibulin, but by no means with certainty."

Edgar<sup>19</sup> remarked as follows: "We have failed to induce labor by the use of the drug alone. It should be stated, however, that when pituitary extract is given some time subsequent to the intro-



duction of gauze, a bougie, or hydrostatic bag into the uterus, the drug apparently initiates uterine contractions."

Bandler<sup>20</sup> recommended the use of a Barnes bag plus small repeated doses of pituitrin. He found that labor ensued as a rule within a few hours. He also advised its use in dry labor.

He tried castor oil and quinine followed by the injection of pituitrin and wrote that: "My observation leads me to the belief that the nearer the date of the expected labor the more likely is the procedure to be successful. In my own experience I should say that in over 90 per cent. of the cases in which this method is tried a few days before the expected date, success will be our reward."

A statement in a recent article to the effect that "pituitary extract is valueless for the purpose of starting labor," led me to look up the literature because it did not entirely coincide with my own experience. In looking over the literature I was struck with its abundance and the relatively few studies of this phase of the use of pituitary extract.

With few exceptions the observers have followed no definite plan in the administration of this drug.

We should remember that the products which are put out are not always potent. We should know that alcohol in a hypodermic syringe causes precipitation and without doubt interferes with its action. The method of administration which I have followed is to repeat small doses of  $\frac{1}{4}$  c.cm. at regular and frequent intervals, varying from fifteen minutes to one hour. If necessary, these injections are repeated until eight have been given or 2 c.cm. If regular uterine contractions become established, the injections are stopped. It is too much to expect of any method that it should always be successful. My experience is limited to the following group of cases which are of some interest. A glance over these points to the fact that pituitrin is apparently valuable in certain types of cases.

CASE I.—Mrs. A. D. P. Grav. I. Due March 28th, 1915.

On April 16th was given  $\frac{1}{4}$  c.cm. of pituitrin at 9:30 p. m., after which she had a few slight pains. The dose was repeated at 9:50 p. m., and in a few minutes after this she began to have pains every three minutes. The child was delivered spontaneously at 12:50 a. m., April 17th. It was a still-birth. The autopsy showed nothing except small subepicardial and subpleural hemorrhages.

CASE II.—Same as above. Para I Grav. II. Due June 29th, 1916. On July 7th she was given  $\frac{1}{4}$  c.cm. doses of pituitrin with no result. This was tried several times without inducing labor. Finally on July 19th labor started naturally and she was delivered spontaneously.

CASE III.—Mrs. C. F. S. Para I Grav. II. Due March 12th, 1915.

On March 11th she was given  $\frac{1}{4}$  c.cm. of pituitrin at 11:30 a. m. This was repeated at 11:45 a. m. She had the first contraction at 11:50 a. m. The contractions became somewhat harder. A third dose was given at 12:15 p. m., also followed by contractions. The fourth dose was given at 12:35 p. m. At 12:42 p. m. the contractions were harder and were associated with pain.

They continued about every five minutes until 3 p. m., after which time there was a period of quiescence until 5:05 p. m. when she received a fifth dose of  $\frac{1}{4}$  c.cm. of pituitrin, after which the pains recurred and labor progressed. The membranes ruptured spontaneously at 3:08 a. m., April 12th, and the child was born alive without unusual difficulty at 4:15 a. m. There were no complications.

CASE IV.—Mrs. W. J. Due March 1st, 1915. Para II Grav. III.

On March 5th she was given castor oil and quinine followed by  $\frac{1}{4}$  c.cm. of pituitrin every hour until 2 c.cm. were given. She had irregular pains, but labor was not induced. The treatment was repeated without definite result.

On March 9th labor was induced by means of a Vorhees bag. Labor progressed and she was delivered, without complications, of a living child.

CASE V.—Para II Grav. II. Due December 12th, 1915. On December 22nd she was given a dose of  $\frac{1}{4}$  c.cm. of pituitrin every fifteen minutes for eight doses. She had quite severe pains which ceased a few hours later. Labor started on December 31st without further interference and she was delivered naturally without complications.

CASE VI.—Mrs. H. Grav. I. Due June 19th, 1916.

At 1 p. m., July 12th, she was given  $\frac{1}{4}$  c.cm. of pituitrin. This dose was repeated every fifteen minutes for six doses. Slight pains began soon after the second dose. At 2:30 p. m. the pains were coming regularly and she had a slight watery discharge. No more pituitrin was given. The labor progressed normally and she was delivered of a living child at 12:55 a. m., July 13th. There were no complications.

CASE VII.—Mrs. A. Para I Grav. II. Threatened eclampsia with high blood-pressure, edema and albuminuria. Due May 1st, 1916.

On April 19th she was given 2 c.cm. of pituitrin in  $\frac{1}{4}$  c.cm. doses every fifteen minutes. She began to have painful uterine contractions which lasted several hours and then subsided. It was repeated on April 20th, four doses of  $\frac{1}{4}$  c.cm. being given which caused pain. It apparently raised her blood-pressure and was discontinued. She was also given five doses of 5 gr. quinine sulphate.

On April 21st labor was induced with a Vorhees bag. Mother was delivered of a living child on April 24th without further complications.

CASE VIII.—Dr. K's patient. Grav. I, *æt.* thirty-five. Two weeks over due. Had some backache but no regular contractions. Cervix soft but no dilatation. Given  $\frac{1}{4}$  c.cm. of pituitrin at 10:30 p. m. Pains started in five minutes. Second dose of  $\frac{1}{4}$  c.cm. given at 10:45 p. m. Pains continued regularly and became progressively harder until delivery at 6:30 a. m.

CASE IX.—Mrs. F. Grav. I, *æt.* forty-five. Due November 18th, 1916.

On October 30th the membranes ruptured, but she had no labor pains. She complained of some backache for several days. The head descended into the pelvis, the cervix became partially obliterated and dilated. On November 3rd at 10 a. m. she was given  $\frac{1}{4}$  c.cm. of pituitrin; after a few minutes she began to have quite regular painful uterine contractions. The above dose was repeated every hour until 2 p. m. She was delivered of a living child at 5:25 p. m. on the same day. There were no unusual complications.

CASE X.—Mrs. C. Para IV Grav. IV. Due December 29th, 1916. Case of placenta previa marginalis with slight hemorrhage. On November 1st at 7 p. m. the membranes ruptured. She bled slightly after this and lost a considerable amount of blood at 7:30 p. m. Examination showed the cervix undilated and only partially effaced. The head was not engaged. At 9 p. m. she was given 4 minims of pituitrin; this was repeated at 7:30 p. m., 9 p. m., 9:30 p. m. and 10:35 p. m. Pains began after first injection. She was delivered of a living

child at 12:18 a. m., November 2nd. There were no unusual complications. The child died about ten hours later.

CASE XI.—Mrs. N. Consultation with Dr. Linner. Para I Grav. XI.

About one month overtime. Breech presentation. She was given  $\frac{1}{4}$  c.cm. doses of pituitrin every fifteen minutes. Pains began after the first injection. Membranes ruptured shortly after the pains started. She was delivered without unusual complications of a living child which died three days later.

CASE XII.—Mrs. W. Para II Grav. III. Consultation with Dr. Linner. Cephalic presentation. About one month overtime. She was given divided doses of  $\frac{1}{4}$  c.cm. of pituitrin. Pains began shortly after the first injection. The membranes ruptured a little later. She was delivered of a living child without unusual complications.

### SUMMARY.

1. The use of pituitary extract for inducing labor particularly in premature, mature and post-mature cases should not be abandoned.

2. It appears to be of value in bringing on labor in premature cases in some instances and is worth a trial where it is not necessary to end the pregnancy rapidly.

3. In cases with ruptured membranes it is of value in initiating uterine contractions.

4. In cases of placenta previa marginalis or lateralis, where the membranes rupture or are ruptured artificially, it is of value for starting uterine contractions and may save the necessity of intra-uterine manipulations.

5. It is a help in cases where mechanical means are used to induce labor and may limit the amount of manipulation necessary.

6. In cases at term it is of value in starting labor.

7. It should be used in cases going overtime before any other method of inducing labor is resorted to, except in those cases where it is contraindicated or it is necessary to terminate the pregnancy more rapidly.

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## THE VALUE OF CYSTOSCOPY IN THE DIAGNOSIS AND TREATMENT OF SOME CASES ILLUSTRATING AN UNUSUAL CAUSE OF RENAL COLIC.

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So much has been written within the past few years in regard to cystoscopy and the conditions for which it may be required, that one hesitates to add to the voluminous literature upon the subject, and my only excuse for so doing is to (1) mention a few very interesting and unusual cases seen by me recently, which either in their diagnosis or treatment the use of the cystoscope could not have been excluded; (2) to emphasize the good results that may be obtained in the treatment of disease of the kidney pelvis by the instillation through the ureteral catheter of curative drugs; and (3) to mention an improved instrument with which the general practitioner may in the course of a very short time acquire the little skill necessary to make an intravesical examination and catheterization of ureters.

Pyelitis is so frequent a condition, especially as a complication of pregnancy and the puerperium and so amenable to local treatment that the importance of acquiring the ability to use the cystoscope cannot be too strongly urged. As has been stated by C. Franke, there is an actual lymphatic connection between the colon and right kidney. It is for this reason that pyelitis is more frequently met with on the right side and becomes very necessary to differentiate the condition from appendicitis. Of the cases to which I referred, one emphasizes this point. I saw the patient, Mrs. H., five weeks post-partum. At this time she had severe pain and tenderness on the right side of the lower abdomen, rapid pulse and elevated temperature (102.4° F.). The condition resembled strongly appendicitis, but while the pain and tenderness were severe, there was not quite so much rigidity as is usually seen in the latter condition. She had a similar attack during the latter part of pregnancy, which her physician told me had been diagnosed as appendicitis and treated with the ice bag; the condition gradually subsided after a prolonged period of rest in bed with liquid diet. The proper diagnosis was made by a chemical and bacteriological examination of urine from the right kidney, obtained by the ureteral catheter, and the patient cured of her condition by the flushing of the renal pelvis with boric acid solution followed by heganon, 1/2 per cent. (as recom-

mended by B. C. Hirst (*Amer. Jour. of Obst.*, Vol. LXIX). For this purpose it is safer to use the two-way ureteral catheter. This will preclude the possibility of excessive pressure being exerted, which, if such were permitted to occur, might cause serious necrotic changes in the kidney parenchyma. If the two-way catheter be not at hand, one should be sure that the catheter used is of not too large a diameter, so that there will be some space between the inner surface of the ureter and the outer surface of the catheter through which the overflow will return. Aynesworth (*Surg., Gyn. and Obst.*, July, 1915) has attributed the cure of these cases not so much to the drug injected as to the dilatation of the ureter. There is no doubt that the dilatation is an important factor in those cases in which there is an obstruction, of which I shall mention some examples presently, but in the cases of infection I believe that the drug is of much value.

Another case of much interest to me was one which presented typical attacks of renal colic over a period of nearly two years, the intervals between the attacks becoming shorter and the patient losing weight (20 to 25 lb.). This condition very closely simulated ureteral calculus, but the catheter met with no obstruction and there was no edema about the orifice of the ureter, disproving this supposition. The patient had a bad cystocele, which was cured by the interposition operation, since which (January, 1915) she has returned to her original weight and has had no further attack of pain. The condition was evidently due to an intermittent hydro-nephrosis caused by the pull of the prolapsed bladder upon the ureter. This effect of a cystocele is quite an unusual condition. Still again, one meets cases of stricture of the ureter due to previous low grade infection analagous to strictures so common in the male urethra, but not gonococcic in origin. These give a good deal of pain by partial obstruction to the flow of urine and resist the usual sized catheter. Several catheters should be inserted, the size gradually increased. In this way the condition may be cured.

During the past year I have seen 3 cases which are examples of this condition. The patients had long-continued pain in a definite position over the course of the ureter, one on the left side, two on the right. Two had negative pelvic findings by vaginal examination, one had been operated upon for retroversion by a general surgeon with good anatomic but no symptomatic relief. This patient had several attacks of renal colic, both before and after the abdominal operation. The passage of the catheters of graduated sizes through the stricture permitted the flow of the accumulated urine behind this situation. The patients recognized immediate relief and their pain has been absent since this procedure.

At the suggestion of Dr. B. C. Hirst, the Wappler Manufacturing Company have made a cystoscope which has several advantages

over those previously on the market. These are the increased size and brilliancy of the lamp and the large visual field. With this instrument the ability to catheterize ureters may be acquired with very little practice; the examination of two or three cases usually being sufficient if one bears in mind these few points. Do not carry the cystoscope too far into the bladder. The lamp should be just inside the internal urethral orifice, the instrument held in the horizontal plane. The position of the lens can be determined by the appearance of the mucous membrane. That of the urethra is a diffused red, while the bladder mucosa is a light yellow color, the blood-vessels being distinctly seen and have clear cut outlines. As the beak of the instrument is reaching the bladder, a field will be seen, in which appears above the light yellow color of the bladder mucosa, below the bright red of the urethra. This latter resembles a half moon, and as the cystoscope is pushed in a little further it gradually becomes smaller. When this half-moon-shaped area has just disappeared, the cystoscope has been inserted sufficiently far into the bladder. It is now rotated on its long axis and a ureter will come into view. This usually appears as a little dark slit running upward and outward across the visual field and at the summit of a little papilla. Its apparent size is increased as the lens approaches the orifice. The opposite ureter is found by rotating the instrument on its long axis in the opposite direction, holding it in the same horizontal plane. The examination of patients late in pregnancy is facilitated by raising the foot of the table so that the fetal head will fall away from the bladder. After the ureter has been found, it is a very simple matter to insert the catheter, using the little shutter to guide it in the proper direction.

While experiments conducted by J. E. Sweet, at the University of Pennsylvania, have shown that infection does not reach the kidney through the lumen of the ureter, it seems to me possible that the irritation of the catheter might cause acceleration of the lymphatic current. It is, therefore, my custom not to catheterize ureters in the presence of bladder infection with uninfected organs in the upper urinary tract.



## EXPERIENCE WITH THE SOLUBLE EXTRACT OF CORPUS LUTEUM, WITH REPORT OF CASES.

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Recent investigations with the corpus luteum seem to show that in addition to its function of sensitizing the endometrium (thus preparing a suitable resting place for the reception of the ovum) as determined by Leo Loeb, that it exerts other and far-reaching general, as well as local, effects upon the female organism.

Animal experiments have clearly shown that the removal of the ovaries in the new-born results in failure of development of the genitalia and of the breasts, as well as skeletal differences particularly noticeable in the shape of the pelvis, excessive longitudinal growth and a disproportion between the length of the trunk and that of the extremities.

Removal of both ovaries in women during their menstrual life only too often gives rise to mental irritability of the most distressing character. Among such nervous symptoms may be mentioned—states of depression, lack of self-control, intense headaches, hot flushes, sensations of pressure or tension in the head, and various parts of the body, backache, irritability of the bladder, pain in the muscles, lower abdomen or in any locality toward which the patient's attention may be directed. The administration of ovarian substance has produced striking improvements in many of these patients.

That the therapeutic effect is due to active substances contained in the corpus luteum is shown in the reports of cases to which references will be made.

Through the courtesy of Drs. Alford, Hugo Ehrenfest, William Kerwin, Otto Schwarz, and Royal Tharp, whose case reports were placed at my disposal, I am enabled to report a larger number of cases. While realizing that such a number does not permit of very definite conclusions as to its specificity, it is hoped that they may be used in connection with more elaborate statistics in definitely determining the various conditions in which corpus luteum is indicated.

The administration of the desiccated gland by mouth has met with but indifferent success in my hands. The cases here reported have all been treated with the soluble extract of corpus luteum (Parke, Davis and Company) put up in 1 c.cm. ampoules, each

containing 20 mgrm. ( $\frac{1}{3}$  gr.) of soluble corpus luteum powder dissolved in 1 c.cm. physiological salt solution, previously saturated with chloretone.

The effect of the soluble extract is more pronounced and rapid than that following the administration of the desiccated product, besides it has the advantage of the personal parenteral administration of the small dose, which is unimpaired by the action of digestive juices.

For convenience, I will offer the following classifications of a total of 47 cases treated with the soluble extract of corpus luteum. Some of these patients had combinations of the conditions mentioned.

1. *Nausea and Vomiting of Pregnancy*.—Two cases. In one the result, as reported, was 75 per cent. improvement. 1 c.cm. doses were given at intervals of every other day. In the other case corpus luteum was given in 1 c.cm. doses every day for six days, at the end of which time patient was relieved of nausea and did not have a return of the condition.

2. *Sexual Anesthesia*.—Two cases. One case was temporarily benefited, but after four or five weeks the patient returned to the office complaining of the former trouble. The second case received 2 c.cm. doses of the corpus luteum intravenously at five- or six-day intervals for about six weeks. At first the improvement was slight, but at the termination of treatment claimed to be sexually normal, the first time in eleven years of married life.

3. *Sterility*.—Three cases. The first case exhibited periodic attacks of amenorrhea. She was given thyroid extract for a period of more than two months, then began taking 5 gr. desiccated corpus luteum three times a day. At the end of one month the patient complained of a fainting sensation and medication was stopped. In about nine months after discontinuing the treatment patient was delivered of a 7 lb. child, conditions apparently normal. The second case was a failure, so far as sterility was concerned, but the complication of sexual anesthesia was materially improved. The third case received 1 c.cm. doses twice a week for about two weeks. In about two months after the last dose was received the patient complained of pains in the abdomen and was passing particles from the uterus, indicating the possibility of pregnancy followed by spontaneous abortion. The patient refused examination and further observations were not made.

4. *Amenorrhea*.—Eight cases. Four unmarried, ages twenty-one, twenty-one, twenty-two and thirty-four respectively. Two of these patients were apparently restored to normal menstrual function, a third was benefited for a time, but later the amenorrhea appeared and this was relieved temporarily by the administration of an additional quantity of the corpus luteum. The fourth case

in this series claimed that she received no benefit whatever. The other four cases in this group were married women, ages eighteen, twenty-four, twenty-six, and thirty-seven years respectively. The first of this series was also suffering with anemia, sexual anesthesia, headache and constipation. She received, in addition to 1 c.cm. doses of soluble extract corpus luteum, Bland's pills, fluid extract cascara, and a diet rich in cellulose. After three months' treatment, menstruation was practically normal. In four months she was sexually normal the first time in more than a year. After a lapse of six months the patient was examined and found to be practically normal in every way. The next patient was relieved of the amenorrhea after receiving twelve injections (1 c.cm. each) of soluble extract corpus luteum, given at intervals of twice a week. The third patient was a large, corpulent woman, married eight and one-half years, never pregnant, complained of headache, backache, and chronic constipation. Received 1 c.cm. soluble extract corpus luteum twice a week, and  $\frac{1}{4}$  gr. thyroid extract three times a day. Although her general health improved, she was not relieved of the amenorrhea. The fourth patient was operated for right tubal pregnancy. Removed right ovary and ruptured tube; this was followed by disturbed menstruation, accompanied by vomiting, severe cramps and abdominal pain; which usually lasted for ten days. 1 c.cm. soluble extract corpus luteum given at intervals of twice or three times a week for a period of four or five weeks. Although the uterus remained somewhat enlarged, a slightly painful menstrual flow appeared at regular intervals, which lasted about four days.

5. *Oligomenorrhea*.—Three cases. First patient, age twenty-two, single, weight 200 lb. 1 c.cm. soluble extract corpus luteum at intervals of two or three days, and thyroid extract, 2 gr., three times a day, continued for about three months; treatment then given at rather irregular intervals for about three weeks. At this time weight reduced to 172 lb., menstruation regular, general health good. Second patient, aged twenty-seven, married nine years. History of rapid increase in weight, sterility. Soluble extract corpus luteum and thyroid extract administered for a period of four weeks. Menstruation freer, better color, general condition materially improved. Third patient, aged thirty, married eleven years. Failed to show any improvement from the administration of corpus luteum. Pelvic examination revealed friable mass in the pelvis, which proved to be tuberculous salpingitis. Hygienic and anti-tuberculous treatment, followed by general improvement in health and normal menstrual function.

6. *Dysmenorrhea*.—One case. Aged twenty-nine, married twelve years, no children; one miscarriage, followed by sterility. Seven doses, 1 c.cm. each, extract corpus luteum at intervals of twice a week, followed by marked improvement. Was then given



several doses of 2 c.cm. corpus luteum for about three weeks. At this time the patient claims to have had perfect menstruation for the first time in her life. General health improved, less nervous, no pain. After discontinuing the treatment for four weeks, the former condition was as bad as ever. No further treatment given.

7. *Menorrhagia*.—Three cases. First patient, aged seventeen, single, factory worker. 1 c.cm. soluble extract corpus luteum, two doses at four-day intervals. All symptoms controlled. After five months returned for treatment for former condition. Received two additional doses at three-day intervals. Flow stopped after second injection. Returned for treatment after another month, as before. This treatment relieved the condition on three separate occasions, results depending upon the continual administration of the corpus luteum. Second patient, aged seventeen, factory girl. 1 c.cm. soluble extract corpus luteum every other day until six doses were administered. Flow ceased for nine days; no permanent result. Was then given  $\frac{1}{2}$  to 1 c.cm. doses of pituitrin every two or three days. Patient showed some improvement from corpus luteum, but responded promptly to the pituitrin. Third patient, married three years. Never pregnant. 1 c.cm. soluble extract corpus luteum twice a week and Bland's pills, 5 to 25 gr., in ascending doses, three times daily after meals, thyroid extract,  $2\frac{1}{2}$  gr., after meals. This treatment was continued for two weeks; no change. Was then given ergotin, 2 gr., four times daily; some slight improvement. This was followed by an injection of one or two doses of coagulose, with a temporary arresting of the flow, slight clotting noticeable in eight minutes. Although the blood clotting showed marked improvement after two doses of coagulose, there was no general improvement in the patient from the administration of any of these agents, and the treatment was discontinued. In about two months patient returned for further treatment. Was given 1 c.cm. pituitrin intravenously at intervals of two days until three doses were given. This seemed to offer more benefit than any other treatment, and the patient continued to show daily improvement until lost to view.

8. *Metrorrhagia*.—Two cases. First patient, aged twenty-nine, single. History of exophthalmic goitre relieved one year previously, followed by menstrual disturbance. Exceedingly nervous and dizzy. Eight doses, 1 c.cm. each, soluble extract corpus luteum at intervals of three to five days, with no improvement whatever. Second patient, aged thirty-six; widow. The condition developed following pelvic operation. 1 c.cm. soluble extract corpus luteum twice a week for three weeks; menstrual period lengthened. 1 c.cm. corpus luteum twice a week for six weeks; at the end of this time patient feeling good, menstruation regular every twenty-eight days.

9. *Menopause, Natural*.—Three cases. First patient, aged thirty-six, married. *History*: Pulmonary tuberculosis two years ago,

gonorrheal infection with posterior pelvic cellulitis. 1 c.cm. soluble extract corpus luteum twice a week for three weeks, followed by marked improvement. Returned for treatment for other condition four months later. All symptoms of menopause absent. Second patient, aged forty-six, married. History of irregular menstruation for three years, small fibroid left of uterus. 1 c.cm. soluble extract corpus luteum twice a week for about two weeks, with some benefit. Although the nervous symptoms improved, the fibroid gradually enlarged, and tender. Operation advised. Third patient, aged fifty, married. Nine doses, 1 c.cm. each, soluble extract corpus luteum twice a week. Menopause symptoms in this case were materially improved.

10. *Menopause, Premature.*—Three cases. First patient, aged twenty-six, married eight years. Never pregnant. Operated for appendicitis; irregular menstruation since marriage. Large, corpulent woman. 1 c.cm. soluble extract corpus luteum twice a week and  $\frac{1}{4}$  gr. thyroid extract three times a day for two weeks. Six months later patient reported menstruation had been more profuse and regular for past three months. Second patient, aged thirty, widow. Muco-purulent discharge for seven years, chronic constipation, hot flashes, pain, etc. 2 c.cm. soluble extract corpus luteum intravenously once a week for four weeks. All symptoms practically disappeared. Third patient, aged forty-two, married, twenty-one years. One pregnancy, resulting in abortion at two months. Patient rather corpulent; in a depressed mental state; bilateral cystic ovaries; chronic constipation. 1 c.cm. soluble extract corpus luteum twice a week for six or seven weeks. Treatment was then discontinued for two weeks, followed by return of the symptoms. Gave 2 c.cm. corpus luteum followed by 1 c.cm. each week for twelve or thirteen weeks, followed by disappearance of most of the symptoms. Any tendency of a return of the nervous symptoms in this case is easily controlled by a few injections of the corpus luteum together with hygienic regime.

11. *Menopause, Artificial.*—Seventeen cases. These patients range from twenty to forty-eight years of age. All gave clear histories of extensive pelvic operations. A careful analysis of these histories shows that twelve patients were practically relieved of all the symptoms attributed directly to the artificial menopause. Five were more or less improved, but were not permanently relieved, nor were all of the symptoms eliminated.

The best results were noted, in the majority of cases, where the treatment was given at intervals of every second or third day, although some received daily injections, occasionally it was found necessary to administer 2 or 3 c.cm. to obtain the maximum benefits. A few of these patients were injected intravenously and the results seemed to warrant this method of medication where the symp-

toms were severe and difficult to control with the subcutaneous or intramuscular injections.

#### CONCLUSIONS.

Nausea and vomiting of pregnancy were greatly improved, although one case might have shown the same improvement under the treatment received without the addition of corpus luteum.

Sexual anesthesia is a decided indication for the administration of corpus luteum. The result is more easily attained in patients who had previously enjoyed intercourse. While this effect had not been constantly present, notwithstanding regular and persistent dosage, the irregular presence of this feature is highly encouraging. One patient volunteered the information (after the eighth injection) that she had enjoyed coitus for the first time after three years of married life. Another patient volunteered the information that she was sexually normal for the first time, although her anemia showed only a slight improvement. When last seen she was still 'feeling fine'; sexual relations perfect.

The effect in these cases justifies the assumption that sexual anesthesia, so extremely common ( $33\frac{1}{3}$  per cent. of the women in Vienna, according to Oscar Frankl) will often respond to the long continued and persistent administration of corpus luteum.

Replying to those advocates of the male being the etiological factor in absentia libidinis in the female, I can only emphasize the fact that the sexual proclivities of every husband cannot be made those of a specialist in his chosen field; hence, some simpler and more practical means must be adopted rather than advising a change in the male partner.

In my opinion, further knowledge of the internal secretory glands will solve this problem.

Sterility, in the presence of apparently normal female genitalia and living motile spermatozoa, is an indication, especially when the patient has periods of amenorrhea.

Amenorrhea and oligomenorrhea are distinct indications although underlying constitutional disturbances, as obesity, tuberculosis, anemia, etc., should receive appropriate treatment.

Dysmenorrhea, having a hypersensitive nervous system as a basic factor in most cases, is improved through the effect of corpus luteum in reducing this hypersensitive state. Theoretically, membranous dysmenorrhea should be an indication par excellence, because of its action in better sensitizing the endometrium.

Menorrhagia and metrorrhagia due to disturbances of the internal secretory system are relieved when the proper arrangement is brought about.

Metrorrhagia alone may be benefited, thus suggesting a double function in the regulation of the menstrual flow. The most strik-



ing results were obtained in the treatment of menopause symptoms; best shown in cases of artificial (post-operative) menopause. All nervous symptoms show marked improvement, usually beginning after the third injection. No improvement or relief indicates insufficient dosage.

Patients with very marked symptoms can receive 1 to 2 c.cm. doses intravenously every other day without untoward effects, with quicker reaction to the substance. The effect upon patients thoroughly treated disappears after two to six weeks (usually four to five weeks) without treatment, although they can be continued on 1 c.cm. doses at longer intervals (as ever seven to ten days; in some cases 1 c.cm. every two weeks).

Patients, who find it difficult to come twice per week for treatment, can receive 2 c.cm. doses once per week, in which event the intravenous injection is recommended.

The administration of corpus luteum may be intravenous, intramuscular or subcutaneous, the rapidity of effect seemingly being in the order named.

The effects of the substances are of varying duration. Menstrual disturbances are apparently permanently relieved, whereas artificial menopause patients seemingly require it indefinitely.

Wall Building.

## BOOK REVIEWS.

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**THE SEX COMPLEX.** A Study of the Relationships of the Internal Secretions to the Female Characteristics and Functions in Health and Disease. By W. Blair Bell, B. S., M. D. Lond., Examiner in Gynaecology and Obstetrics to the University of Belfast, and to the Royal College of Surgeons, England, etc. etc. New York: William Wood and Company. 1916. Price, \$4.00.

The purpose and aim of this volume can be stated best in the author's own language. Most of the more recent investigations have tended to show that the reproductive functions are directed and controlled by all the organs of internal secretion acting in conjunction. Thus the existence of a definite genital system, representing all the endocrinic glands, is strongly suggested. This relation of the internal secretions to sex function, termed by the author 'sex complex,' represents the general topic of this volume. The book is divided into two parts. The first considers all the factors which lead to the production and maintenance of the normal characteristics and functions of woman, including both the characteristics of the body and the mind. The second part deals with the morphological and physiological derangements of the sex complex. Those familiar with current medical literature must be well aware of the fact that the author, for the past several years, has been greatly interested in this fascinating and important question, and, therefore, is competent to propound definite theories and explanations even in the face of certain objections. While constantly emphasizing his own idea of the importance of the calcium metabolism, he quotes all the other investigators in this field generously and freely enough to make this book a most valuable and complete résumé of the entire problem.

**HANDBOOK OF MASSAGE FOR BEGINNERS.** By L. L. Despard, Member and Examiner. Incorporated Society of Trained Masseuses. New York: Oxford University Press. 1916. Price, \$2.00.

This book was written primarily for those who wished to learn massage to help the wounded soldiers. It is also intended to be a book of convenient size, dealing with the theory of massage, for those who are taking up the profession for other reasons. The author, however, warns the reader that the book is not supposed to take the place of a regular course in massage.

The book is divided into fifteen chapters covering the Influence of Massage: Classification and Description of Massage Movements, Description of Passive and Active Movements, Description of Massage, Massage for Sprains, Dislocations, Recent Fractures and Stiff Joints, Paralysis, Deformities, Diseases of the Circulatory System, Massage and Exercises for Abdominal Conditions, Constitutional Diseases, Functional Diseases of the Nervous System, Diseases of Obscure Origin, Massage in Cases of Bullet and Shrapnel Wounds, Frost-Bite (so-called) and Traumatic Neurasthenic Lubricants,

Fomentations, Bandages, Medical Electricity. It also contains a Glossary and an Index.

The subject-matter covers a wide extent. It is condensed as the book is only two hundred and fifty-seven pages, and is very well and systematically arranged. The illustrations are good and add much to the value of the text.

It is an admirable book for its purpose, and is also useful for those who are interested in massage as an adjunct to their other work.

**TREATISE ON FRACTURES.** By John B. Roberts, A. M., M. D., F. A. C. S., Professor of Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine, etc. etc.; and James A. Kelly, A. M., M. D., Attending Surgeon to St. Joseph's, St. Mary's and St. Timothy's Hospitals, etc. etc. With 909 Illustrations: Radiograms, Drawings and Photographs. Philadelphia: J. B. Lippincott Company. 1916. Price, \$6.00.

This book is a valuable treatise on fractures. It covers the entire field of fractures, and is very well and systemically arranged. The first chapter on General Considerations is up to date, and has many valuable illustrations. Especially valuable are the *x-ray* illustrations of normal bones and joints, in particular those of children, showing the various epiphyseal lines. The *x-ray* pictures are clear and distinct.

The chapter on Operative Treatment of Closed Fractures is up to date and the modern technique is well described, and the good illustrations and anatomical diagrams assist in rendering the text clear. The author is also conservative in his treatment of the subject.

The rest of the book takes up in detail practically all the fractures from the cranium to the phalanges of the feet, and the final chapter deals with gun shot fractures. Nearly all the material in this chapter is secured from the experience of surgeons in the present war.

The book is profusely illustrated, by *x-ray* photographs and by anatomical diagrams, which add very much to its value and to the clearness of the text.

**A PRACTICAL TREATISE ON DISORDERS OF THE SEXUAL FUNCTION IN THE MALE AND FEMALE.** By Max Hühner, M. D., Chief of Clinic, Genito-urinary Department, Mount Sinai Hospital Dispensary, New York City; Formerly Attending Genito-urinary Surgeon, Bellevue Hospital, Out-Patient Department and Assistant Gynecologist, Mount Sinai Hospital Dispensary, New York City, etc. etc. Philadelphia: F. A. Davis Co. 1916. Price, \$3.00.

Every specialist, as a rule, finds himself most interested in the borderland between his own special and other branches of medicine. Hühner, a urologist of note, in this volume expertly and ingeniously discusses the relation of definite diseases of the genito-urinary tract to neurology and abnormal psychology. The various pathological manifestations of sex desire and function, the results of abnormal sex practice and some unusual forms of sexual neurosis are dealt with from the point of view of etiology, symptomatology, diagnosis, but especially of systematic, particularly



local, treatment. It is this latter feature which determines the value of the work to the practitioner, since according to the author's assertion, the great majority of sexual disorders which come for medical advice and which at the same time are amenable to treatment, are those which fall under the heading of sexual neurosis.

**DISEASES OF OCCUPATION AND VOCATIONAL HYGIENE.** Edited by George M. Kober, M. D., LL.D., Washington, D. C., and William C. Hanson, M. D., Belmont, Mass. With Illustrations and Reference Tables. Philadelphia: P. Blakiston's Son and Co. 1916. Price, \$8.00.

Until recently, little work has been done on occupational diseases in this country, and our textbooks have been based chiefly upon European observations. The book under review is the first one of its kind to concern itself primarily with American conditions, though even here of the thirty odd contributors, two are Englishmen, one Austrian, and one Italian. It is difficult to speak of the book without what might be thought undue enthusiasm. Although the chapters are somewhat unequal in value, as is inevitable where a large number of contributors are collaborating, the general level of the volume is extraordinarily high. It divides the subject-matter into three main parts. The first is devoted to the specific occupational diseases and neuroses and is divided up among a large number of contributors. The second part, dealing with their causation and prevention, is almost entirely the product of Prof. Kober, the senior editor. The third part, chiefly statistical, will be found valuable mainly by investigators in this field. The editors have succeeded in making the book a safe and convenient guide to all who may be interested in the study of occupational diseases.

**PRINCIPLES OF DIAGNOSIS AND TREATMENT IN HEART AFFECTIONS.** By Sir James MacKenzie, M. D., F. R. S., F. R. C. P., LL.D., Ab. and Ed., F. R. C. P. I. (Hon.). Physician to the London Hospital (in Charge of the Cardiac Department), Consulting Physician to the Victoria Hospital, Burnley. New York: Oxford University Press. 1916. Price, \$2.50.

Our modern notions of cardiac disease are based primarily upon investigations undertaken by means of the graphic methods, chiefly the polygraph and the electrocardiograph. It is a curious fact, that the greater the experience of the clinician with these mechanical methods, the more he can dispense with their aid. In the little book under discussion, MacKenzie, one of the pioneers in the graphic study of heart disease, attempts to share the results of his life work with those who, for some reason or other, have not had an opportunity to follow him in his methods. In this he is only partly successful. The one to profit most by a study of the fascinating little book will still be the clinician who has made a special instrumental study of heart disease, but no physician can read the book without both pleasure and profit.

**CANCER: ITS STUDY AND PREVENTION.** By Howard Canning Taylor, M. D., Gynecologist to the Roosevelt Hospital, New York, etc. etc. Philadelphia: Lea and Febiger. 1915.

We are at present undeniably in possession of several methods of treatment which are capable of effecting a permanent cure of can-

cerous growths. Such favorable results, however, can be obtained only when treatment is instituted while the carcinoma still is a localized process, *i. e.*, before distant metastases have developed. Thus the successful therapy of all malignant processes, in spite of the evident improvement of surgical and non-surgical therapeutic methods, remain almost entirely dependent upon the early recognition of the disease. Better and thorough familiarity with the symptomatology of malignant changes in the various organs is the one important desideratum.

The volume before us promises to render good service in the fight against cancer. Though small in size, the work, with rare completeness, presents all the important information at present available concerning cancerous growths in the different parts of the body.

**DIAGNOSTIC METHODS.** Chemical, Bacteriological and Microscopical.

A Textbook for Students and Practitioners. By Ralph W. Webster, M. D., Ph. D., Assistant Professor of Pharmacological Therapeutics and Instructor in Medicine in Rush Medical College, University of Chicago, etc. etc. Fifth Edition, Revised and Enlarged with 37 Colored Plates and 171 Other Illustrations. Philadelphia: P. Blakiston's Son and Co. 1916. Price, \$4.50.

The appearance of the fifth edition of Webster's "Diagnostic Methods" in seven years is proof of its popularity. The curtailment of investigation along all scientific lines since the beginning of the war, has prevented this, the 1916 edition, from differing greatly from its predecessor, issued in 1914. There are, however, a considerable number of additions, among which may be mentioned a discussion of the endameba gingivalis, the Schick diphtheria toxin test, Wagner's dry test for occult blood and the test of blood, before transfusion. A great merit of the book is an elaborate array of references.

**DISEASES OF THE THROAT, NOSE, AND EAR.** By William H. Kelson, M. D., B. S., F. R. C. S. (Eng.), Surgeon London Throat Hospital, Golden Square, etc. etc. New York: Oxford University Press. 1915. Price, \$3.00.

This book of 250 pages covers the combined subjects of the diseases of the nose, throat and ear. It is intended for the general practitioner and senior student, but not for the specialist. As such it should serve as a useful guide to the practitioner who is conscientious and recognizes his limitations, while it gives the senior student about all the information which he can digest in the time allotted the specialties in the average medical curriculum.

In so brief a work a large amount of space can hardly be allotted to any one subject. The entire field, however, is well covered and the teaching is sound. Special attention should be called to the illustrations which are many and illuminating.

**MANUAL OF PRACTICAL GYNECOLOGY.** By M. J. Seifert, A. B., M. D., F. A. C. S., Attending Surgeon and Lecturer on Gynecology, St. Mary of Nazareth Hospital, Professor of Surgery and Head of the Surgical Department, The Chicago Hospital College of Medicine, etc. etc. Chicago: Chicago Medical Book Company. 1915.

Starting with the embryology of the female genitalia and ending

with advice to nurses, menus of various forms of diet, a chapter on word analysis and a glossary with pronunciation, this little volume covers the entire field of gynecology rather thoroughly. If we add the assurance that seemingly nothing of importance has been left out and that nowhere conciseness interferes with clearness enhanced by good illustrations, we may be permitted to pronounce this manual a tabloid of practical gynecology without arousing the suspicion that we are attempting to be facetious or witty. It actually contains in compressed form all the active principles of modern gynecology.

**OBSTETRICS—NORMAL AND OPERATIVE.** By George Peaslee Shears, B. S., M. D., Professor of Obstetrics and Attending Obstetrician at the New York Polyclinic Medical School and Hospital, etc. etc. 419 Illustrations. Philadelphia and London: J. B. Lippincott Company. 1916. Price, \$6.00.

While occasionally mentioning De Lee and Bumm, the author most persistently quotes himself—and this fact is here emphasized because together with an engaging literary style it gives to this volume the stamp of attractive individual opinion. Shears simply attempts to describe the science and art of obstetrics as he applies them in his every day work. He is not so much concerned with theoretical discussions of muted and irrelevant problems as with the more important problem of how to practise obstetrics in accord with the best and most effective methods. This is not a book to be studied and memorized, but to be read and enjoyed both by student and practitioner.

**POST-MORTEM METHODS.** By J. Martin Beattie, M. A., M. D., Professor of Bacteriology, University of Liverpool, etc. etc. New York: G. P. Putnam's Sons. 1916. Price, \$3.25.

This is a most excellent book, as books of this sort go. One cannot expect to become a trained pathologist by reading a book on the subject, and the author seems to bear this point in mind. It is pleasing to see then that the finer details of pathologic anatomy and histology are omitted and stress laid on simple methods. After having just read a book on the same subject as the above, where over two hundred instruments are pictured as advisable for post-mortem work, it is a relief to find that the general practitioner, if he has to, can still do an autopsy with a knife, saw, scissors, chisel and hammer, and a pair of forceps.

**THE ENDEMIC DISEASES OF THE SOUTHERN STATES.** By William H. Deaderick, M. D., Member of the Hot Springs Medical Society, etc. etc. and Loyd Thompson, M. D., Member of the Hot Springs Medical Society, etc. etc. Illustrated. Philadelphia: W. B. Saunders Company. 1916. Price, \$5.00.

This book is devoted to a more detailed discussion of the diseases especially prevalent in our Southern States, than can be found in all but our most extensive textbooks. The chapters on malaria, blackwater fever, hook-worm disease and other intestinal parasites are from the pen of Dr. Deaderick; those on pellagra and amebic dysentery were written in collaboration with Dr. Thompson. The volume will be found a useful book of reference especially for our Southern practitioners.



# SUPPLEMENT

ON

## ROENTGENOLOGY

(ISSUED QUARTERLY)

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## THE YEAR 1915 IN ROENTGENOLOGY.

The year that has just passed is marked by two significant events in roentgenology. Briefly, they are the general acceptances of the Coolidge tube and the manifest confidence which our surgical confrères now display in gastro-intestinal roentgen findings.

While the Coolidge tube was marketed almost two years ago, it remained for the past year to establish firmly the universal and unlimited availability of this wonderful invention. The flexibility and easy manipulation of the Coolidge tube is truly marvelous.

The confidence with which only one or two men could attack malignancy is now enjoyed by nearly every possessor of a Coolidge tube. It will shortly be more generally used in radiography, if the manufacturers can arrange a sharper focus for certain bone roentgenograms. Already one finds it satisfactory for gastro-intestinal work, especially in serial plates.

The warnings concerning the necessity of ample protection, sufficient filtration and careful ventilation are just as important to-day as they were before this tube was in general use. Familiarity breeds contempt and puts caution aside. We should not permit our enthusiasm to obscure the possibility of another harvest of burns because of carelessness or unpreparedness.

Our second theme deals with the general acceptance of roentgen findings in the surgical attack upon gastric pathology. While the year has witnessed an unusual increase in fluoroscopic apparatus in large and small centres, and even in isolated communities, it would seem that the merits of the direct serial plates have become more firmly entrenched in America. The Coolidge tube has surely served to assist materially in diminishing the tube troubles of serial exposures.

It seems that medical literature during 1915 has been surcharged with gastro-intestinal roentgenology. Many surgical articles now take the roentgen findings as a matter of course. All of which brings joy to roentgenologists and certainly adds to the sum total of diagnostic values.

Roentgentherapy is taking a decided stand in the attack upon malignancy. Before long the question will not be, "Shall we operate or not?" but rather, "Is this a case for the surgeon or the roentgenologist?" As Christof Mueller says in comparing surgery with radiotherapy (*Muench. Med. Wochenschr*, 1914, 22, p. 1226): "The general practitioner therefore, when confronted with the question: radiotherapy or surgery? may conscientiously recommend the former, provided a competent specialist takes the responsibility."

Such a choice seems rather premature to American physicians who are hardly as familiar with deep roentgentherapy as our Continental friends. But surgery has proved itself incapable of handling late malignancy, and unfortunately it is usually at this stage that the cases consult competent surgeons. This fact should not lessen the educational ardor of cancer campaigns, but it would seem reasonable that the judgment of certain eminent roentgenologists could assist the surgeons who are furnishing the medical brains for cancer education.

There are many new things in roentgenology, both from the

standpoint of diagnostics and technique, during the past year. For instance, we might mention the increase in dental radiography, promoting the attack upon arthritis and other famous *rheumatic* and *neuralgic* affections. A conflict in dental philosophy may possibly be impending because of the arguments proposed by physicians against the present conception that preservation is always better than eradication. The roentgen ray is going to be a favorite method of showing results and proving the victor victorious.

Better technique, the result of improved apparatus, has provoked the inventive genius of many; and fortunately the manufacturer has had sufficient return to warrant the expense of new models. Without prosperous sales there is little change in any mechanical contrivance. The prosperity of the country is reflected in roentgen advances.

The year has witnessed the increase in roentgen societies and conferences. The American Roentgen Ray Society has assumed a dignity that is warranted by the character of its members and the high standard of its policies. The Pacific Coast Roentgen Society, The Central Association of Roentgenologists, The Texas Roentgen Society and others will serve splendidly to educate their members and spread the gospel of efficient roentgenology.

E. H. S.

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#### ROENTGEN PREPAREDNESS.

The recognition of the practical possibilities of roentgenology by surgical authorities and eminent internists has increased the distribution of roentgen apparatus to an enormous extent. Coincident with this there should be an increase in efficient roentgenologists. These new machines are being used; but how often is this delegated to the medical neophyte, nurse or orderly!

Patients are demanding the systematic roentgen examination. They have come to know the value of such procedures and are cognizant of the high percentage of efficient roentgen findings as recorded by competent roentgenologists in large clinics and modern laboratories.

In large centres the competition among hospitals and clinics forces efficient roentgen work. The surgeon and internist, dentist and dermatologist, demand and require that the roentgenologist produce records that will stand the test of treatment, operation or an autopsy. There is also sufficient intelligent co-operation and sympathetic encouragement to stimulate the roentgenologist to work out his findings to the utmost diagnostic fact.

Medical visitors, usually surgeons to such institutions, witness the great advantages of the roentgen laboratory in the diagnostic acumen of the clinic, the added comfort to the patient, and the domestic economy of the hospital. To reiterate: Surgical procedures are conducted more expeditiously because of the preliminary roentgen survey of an abdomen or an osteomyelitic bone, etc.; the patient is not subjected to many painful manipulations or endoscopic examinations for the reason that the painless roentgen method helps to avoid them; and the result of these two propositions is to shorten the stay of the patient in the hospital because of shock avoidance from prolonged exploratory operations and tissue



trauma. Have you ever stopped to consider that the exploratory operation is not mentioned very often, since efficient roentgenologists have become attached to clinics and hospitals?

The roentgen situation then resolves itself thus. The surgeon from the small hospital sees the remarkable advantages of the roentgen laboratory when he visits the big clinic and then he hastens to purchase equipment for his own ambitious institution. The apparatus is installed, the manufacturer proves its capacity by producing an awe-inspiring flaming spark and leaves the young elephant to the tender mercies of the dreaming surgeon. Everything is complete except that there is no one about to interpret the plates or the fluoroscopic shadows! There's the rub! Oh! for a little knowledge upon roentgen principles of interpretation; a little insight into roentgen anatomy—a faint idea upon normal and abnormal roentgen distortion shadows. Even the technique of exposures and the minutiae of development loom large before this simple surgeon who appreciated the value of this new diagnostic aid but minimized the necessity of a few roentgen brains. So this ambitious surgeon proceeds to delegate the tedious technique of his roentgen laboratory to the fascinated neophyte who trails the fashions in medicine. And so the laboratory becomes established and plates are produced and treatments are administered according to the directions of the surgeon. And the interpretations? Oh, yes—the patient is shown the plate, and the plate is explained and interpreted to suit the surgical diagnosis, which spells operation.

He was a wise consultant who said that all that an operator needed was an x-ray plate and the consent of the patient.

But, hark ye, would this ambitious surgeon attempt to go home and do a gastroenterostomy after seeing one case and purchasing the necessary instruments? Would he attempt to interpret a microscopic slide without taking some training in clinical pathology?

Just so in entering upon roentgen diagnosis, the surgeon of the smaller hospitals, who must perforce assume this additional rôle, should studiously apply himself to the principles of roentgenology and seek practical knowledge in an established roentgen clinic even before he purchases equipment. Either this, or add a roentgen assistant to his staff.

And this brings us to a consideration of the new super-laboratory man, the physician who equips his brain and his laboratory for the pursuit of all manner of clinical laboratory examinations. Every community, capable of supporting the smallest hospital, can afford a respectable income to such a physician. The combination pathologist, roentgenologist and serologist—the super-laboratory man. But this is another story.

Suffice it to say, that unless the vast array of new apparatus secures efficient brains to make its results stand the test, it will rust with other elephants, like the static machine, the electric bath, the nebulizer, etc., *ad infinitum medicorum*.

Did some one remark that there were no fashions in medicine? Why the most fashionable thing at present is a bound volume of views obtained upon a bismuth excursion through the gastro-intestinal tract!

E. H. S.

## WESSLER: LUNG SUPPURATION

### LUNG SUPPURATION AFTER TONSILLECTOMY.

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By H. WESSLER, M. D., of New York,  
Associate Roentgenologist, Mt. Sinai Hospital, New York.

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The term 'lung suppuration' rather than lung abscess or gangrene, is used advisedly to designate the infections of the lung due to aspiration, which occur after tonsillectomy. The latter terms are apt to convey the exclusive impression that the lung is the seat of a cavity filled with pus. Such an impression is but partly true and is not based on a true conception of the pathologic process, and is especially not in conformity with the mental image which we derive from a roentgen examination.

Even the clinical history itself suggests that these patients become the subjects of a pneumonia due to the aspiration of infected material from the tonsils, and it is in only a certain percentage of cases and after a period of incubation of a few days usually that suppuration sets in with the formation of a single or several abscess cavities. Whether the pneumonic process resolves in a normal way or goes on to suppuration will depend on a number of factors, notably on the virulence of the infecting organisms.

The fact remains, as can be determined by a study of such lungs excised at operation, that they are affected by an inflammatory process in various stages of organization and resolution, whose extent is usually out of all proportion to the small irregular areas of suppuration or bronchiectasis which may lie at the center of it.

We wish to report clinically, and especially from the roentgen standpoint, 8 cases of suppuration of the lung following tonsillectomy which were studied in the Roentgen Department of Mt. Sinai Hospital during the past year. For the privilege of reporting them we are indebted to Drs. Meyer, Brill and Lilienthal, on whose services they occurred.

During this period we have observed, in all, 28 cases of pulmonary suppuration. It will be noted that of these, 28 per cent. are subsequent to tonsillectomy—a considerable percentage. It is important to note also that a general anesthetic was administered in each of these cases and must undoubtedly stand in close relation to the pulmonary infection. Into this phase of the subject, important as it is, we shall not enter any further, but confine ourselves to a discussion of the clinical findings.

The symptomatology is a remarkably uniform one and differs little from that of other forms of suppuration of the lung. The

CASES OF POST-TONSILLECTOMY SUPPURATION OF LUNG.

Case	Age	Sex	Onset of Pulmonary Symptoms after Tonsillectomy	Onset of Signs of Suppuration after Tonsillectomy	Duration at time of Roentgen Exam.	Duration up to Time of Cure	Blood Count	Distribution of Lesions
1	31	M	Immediately	10 days	4 months	5 months	W.B.C. 14,500 Polys. 70%	Right upper lobe. Cavity.
2	35	M	1 week	8 days	5 weeks	Not cured	W.B.C. 17,500 Polys. 74%	Right upper lobe. Multiple cavities.
3	22	F	Immediately	Immediately	4 weeks	2 months	W.B.C. 15,000 Polys. 76%	Right upper lobe. Multiple cavities.
4	30	F	10 days	10 days	3 weeks	6 weeks	W.B.C. 13,800 Polys. 82%	Right lower lobe.
5	30	F	1 day	2 weeks	3 weeks	10 weeks	W.B.C. 12,000 Polys. 74%	Left lower lobe. Cavity.
6	18	F	1 day	2 weeks	4 weeks	2 months	W.B.C. 20,000 Polys. 76%	Right upper lobe.
7	10	M	1 day	1 day	3 weeks	6 weeks	W.B.C. 26,000 Polys. 82%	Left lower lobe. Cavity.
8	40	F	5 days	13 days	20 months	20 months (operated)	..... .....	Right middle lobe. Cavity.



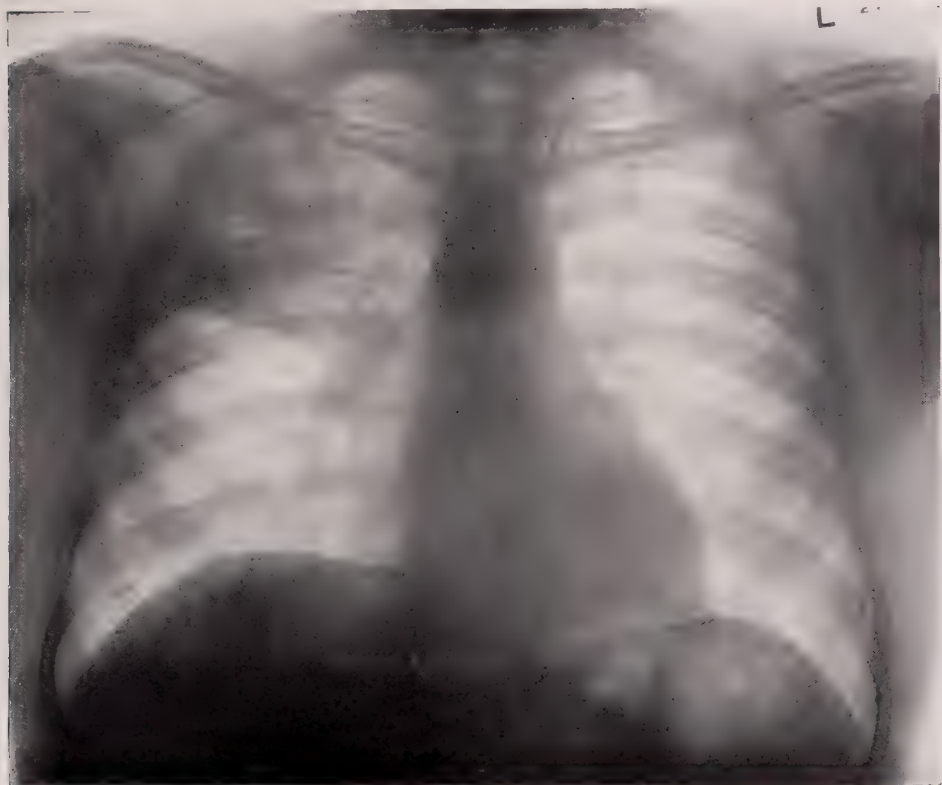


Fig. 1.—Lobar type of infiltration, showing several abscess cavities (Case 2).

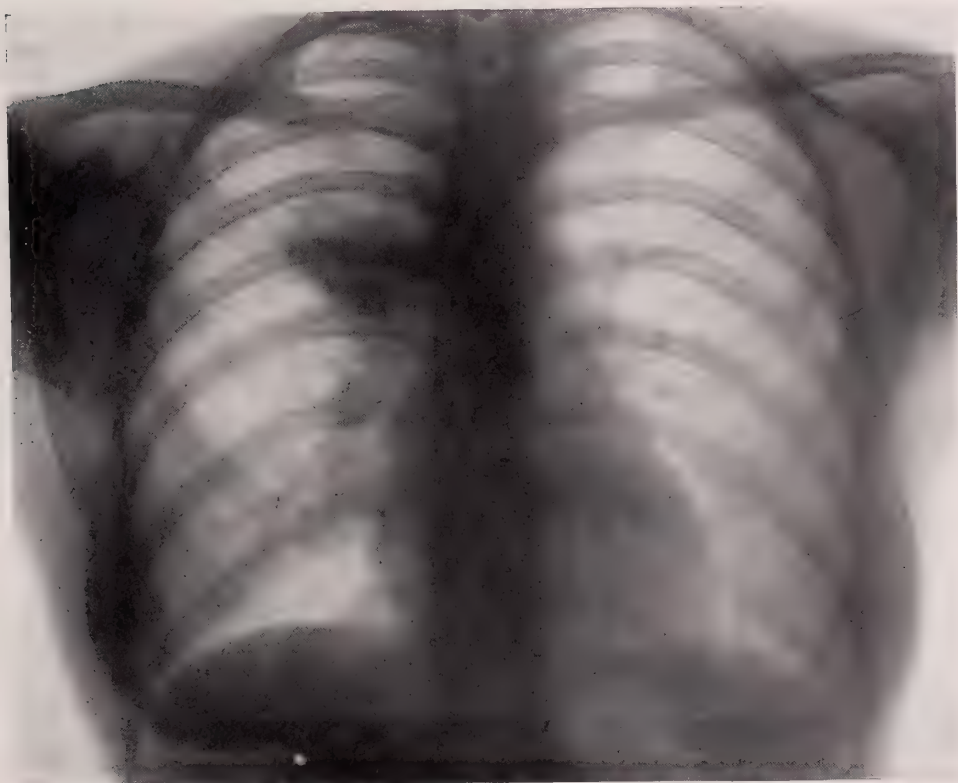


Fig. 2.—Infiltration at the right hilus. No cavities seen (Case 3).

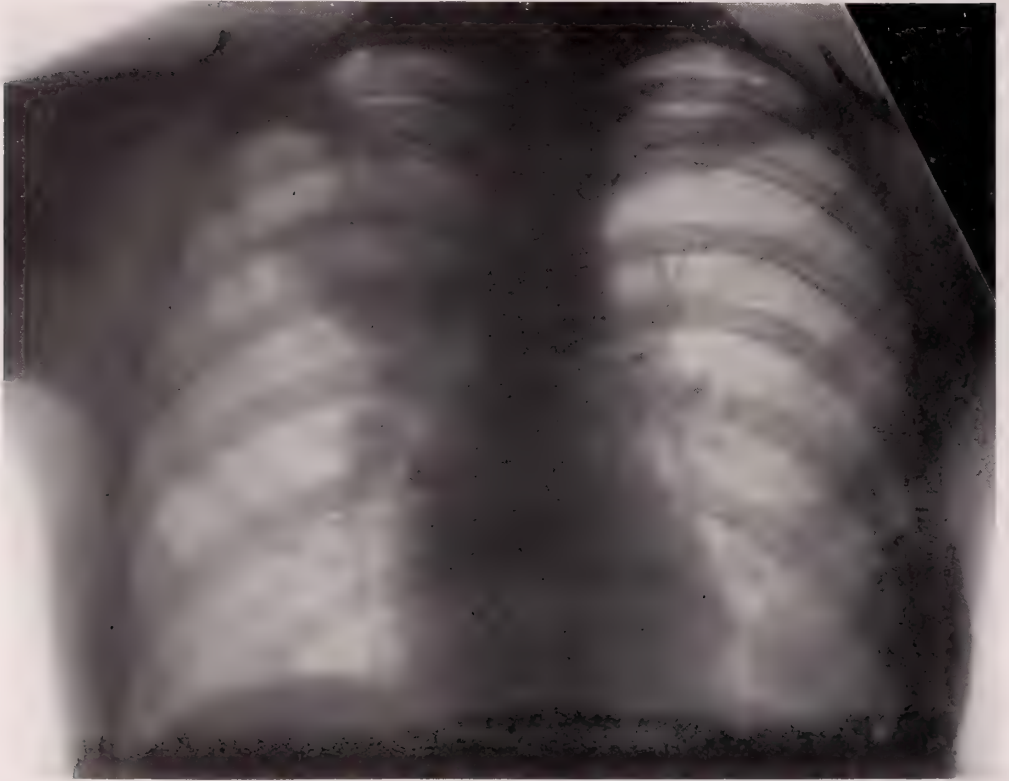


Fig. 3.—Same as Fig. 2, one week later. Patient had expectorated 8 oz. of pus. Several small cavities are now visible within the infiltrated area (Case 3).



Fig. 4.—Same as Fig. 3, two months after tonsillectomy. Patient is clinically well and the infiltration absorbed (Case 3).

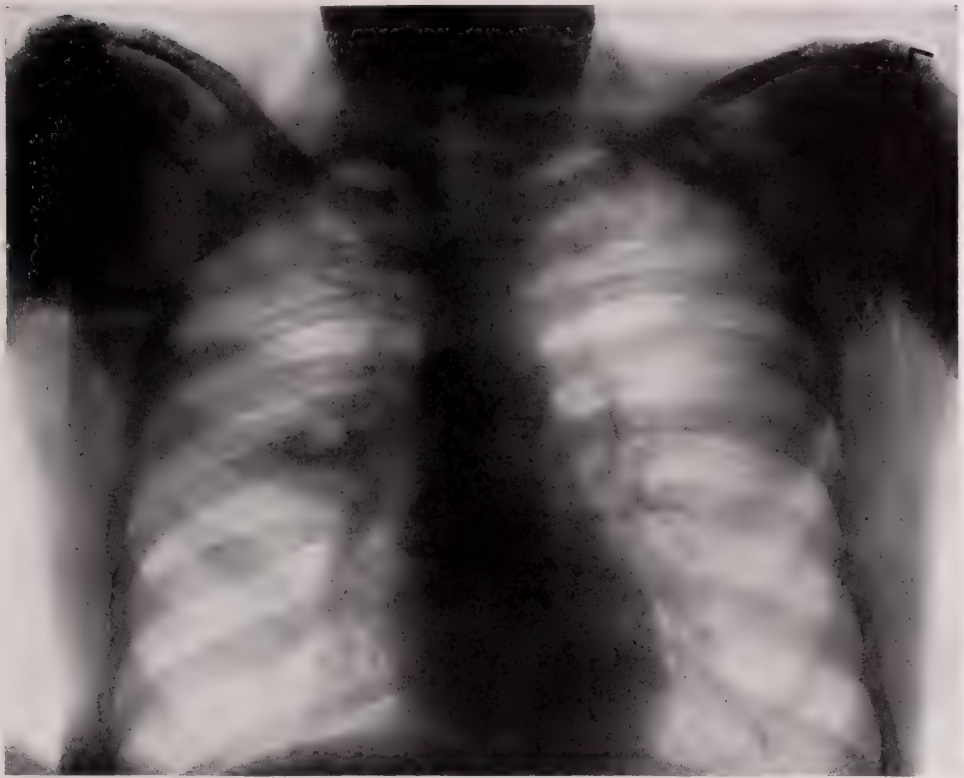


Fig. 5.—Hilus infiltration with a single cavity (Case 1).

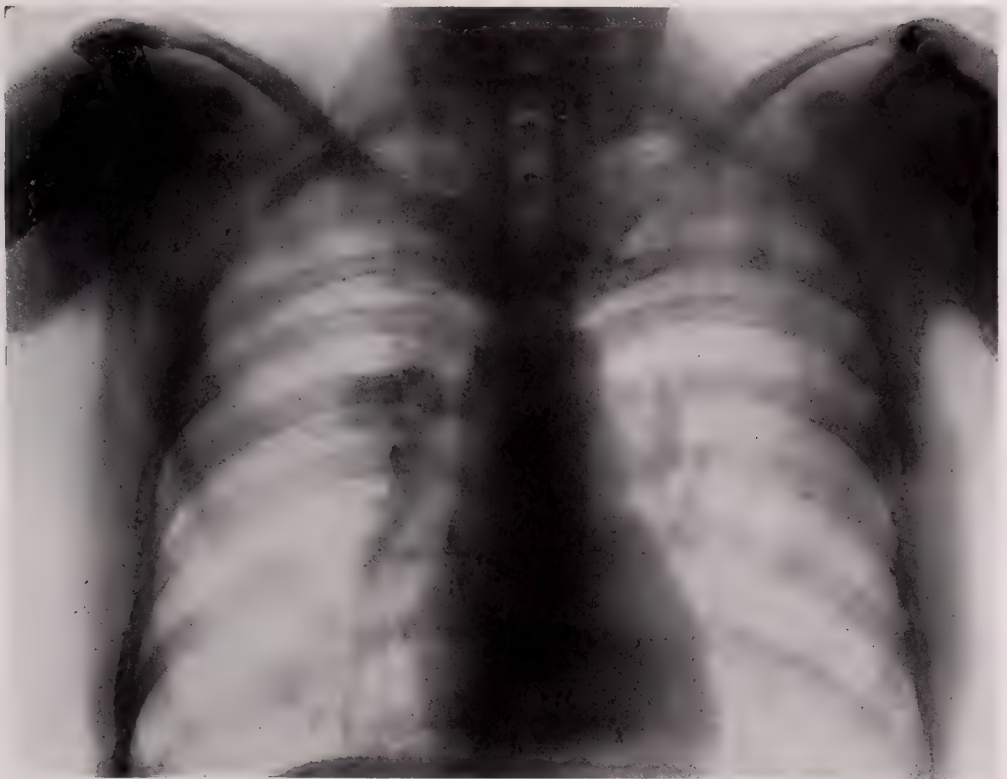


Fig. 6.—Same as Fig. 5, one month later. Clinically well, infiltration disappearing.



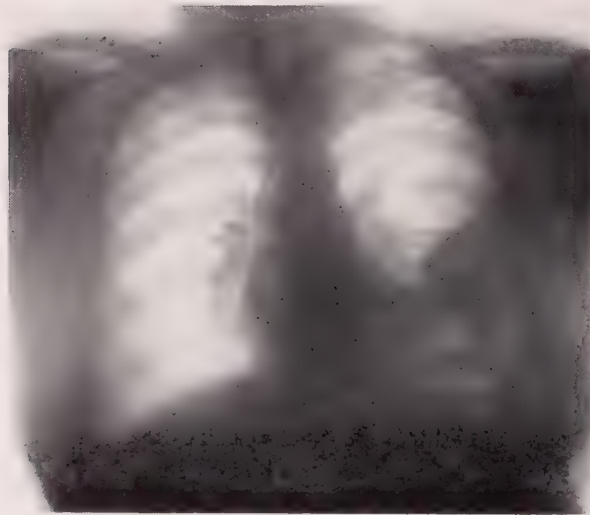


Fig. 7.—Uncommon location, at the left base. On fluoroscopic examination a cavity with shifting fluid was faintly indicated. Although the roentgen examination showed this infiltration on repeated examinations, the patient remains clinically well (Case 5).

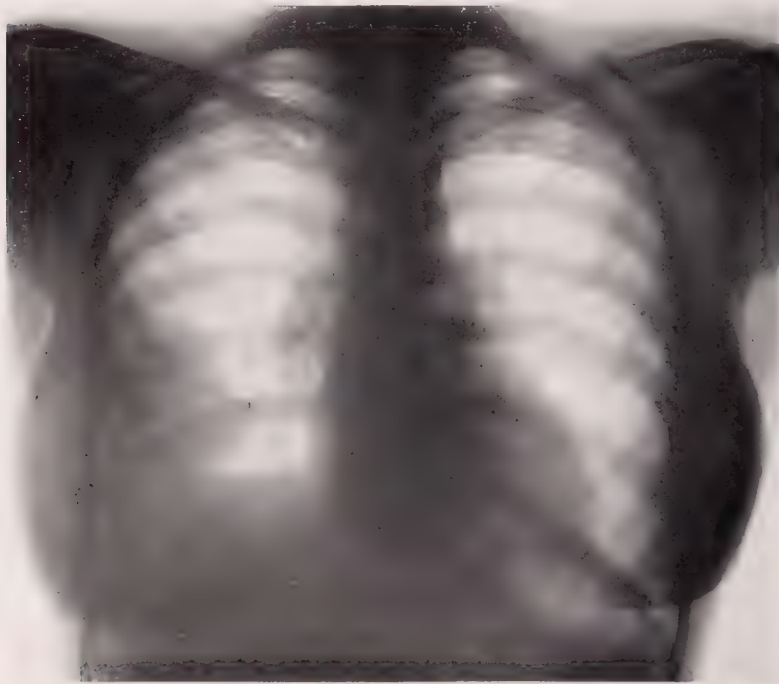


Fig. 8.—Suppuration at the right base. A cavity is faintly indicated. Three weeks later the roentgen examination showed an almost complete resorption of the infiltration (Case 4).

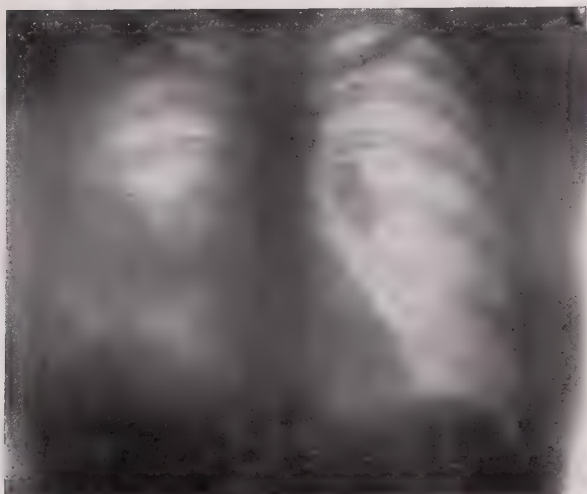


Fig. 9.—Process in the middle lobe, demarcated above by the thickened line of the interlobar fissure. No cavity seen (Case 8).

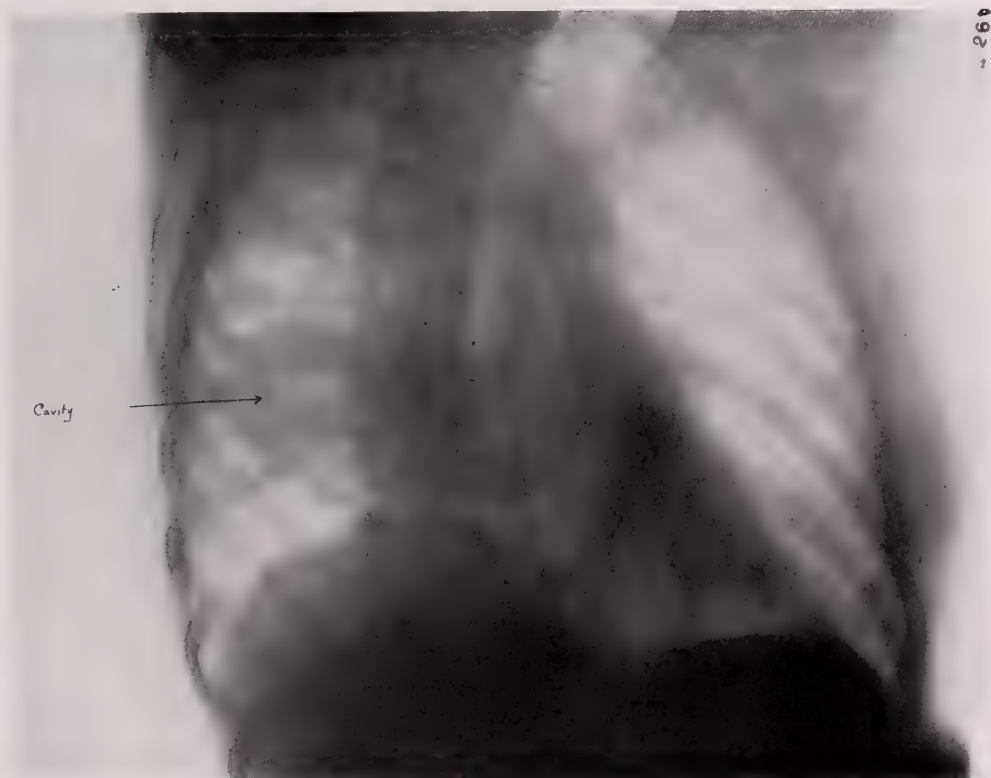


Fig. 10.—Same as Fig. 9, the examination being in the oblique position. There is now visible an irregular cavity within the infiltration and pointed diaphragmatic adhesions. Operation with excision of the middle lobe.





pulmonary symptoms usually set in fairly suddenly. It is evident from the history of the cases that in a certain number the primary process is a bronchopneumonia induced by the aspiration of the infected material, and that only later the evidence of suppuration supervenes with symptoms of sepsis, such as chill, high fever and the expectoration of purulent material. Thus a reference to the chronology of these cases in the appended chart will show that in only one case did the symptoms of suppuration occur immediately after tonsillectomy. In the majority, purulent or gangrenous sputum developed from eight days to two weeks after tonsillectomy.

In practically all the cases at some time or other the sputum was foul-smelling, and for this reason there is some justification for describing them as cases of gangrene of the lung. An acquaintance with the pathology will show, however, that the gangrene represents a subordinate lesion. The putrefactive organisms usually cause small focal areas of gangrene, and as these are sloughed out the sputum becomes fetid. This is but an incident in the clinical course and usually does not affect its general trend. Periods of gangrenous sputum alternate irregularly with others in which the sputum has no distinctive odor. It is of interest that in one case an odor of gangrene was noted by the patient in her breath, eight days before the expectoration made its appearance.

Hemoptysis is a very constant symptom and is of all grades, from a slight brownish discoloration of the sputum to the expectoration of a pint of blood, and is usually repeated frequently during the course of the disease. Pain is also frequent and sometimes harassing, and is due to the associated pleurisy.

A predilection for the right lung is noted in the distribution of the lesions, six affecting the right lung and two the left, and any of the lobes may be involved, in one case the right middle.

The physical signs by themselves are perhaps of the least value for diagnosis and are frequently not distinctive. As a rule, an area of dulness of varying extent is demonstrable with but few changes in the character of the respiratory sounds. The breath sounds in these cases were frequently diminished in intensity, and in only one case were there physical signs which could be interpreted as those of a cavity. This is easily understood when it is recalled that the small irregular areas of broken-down lung are often deeply seated and may lie near the root of the lung. It will thus be seen that we are confronted with the signs of consolidated and poorly aerated lung, sometimes covered by a thickened pleura, and that the condition of suppuration or cavity formation is an inference drawn mainly from the history and the character of the expectoration.

The patients are, as a rule, not acutely ill. At the outset they have fever and chills which may be repeated with remissions, during which the temperature does not rise above 100-102° F. At such

times they may appear entirely well except for moderate cough and expectoration. The leucocyte count is moderately elevated with a slight polynuclear increase.

The course of this disease is apparently more favorable than one is led to believe from the literature of aspiration abscess or gangrene. Of the 8 cases, 6 were cured spontaneously and one by operation with excision of the affected lobe of the lung. The latter was of long standing, two years, and the lung was found carnified and probably not amenable to spontaneous cure. One case remained unimproved.

The duration of the spontaneously cured cases was from six weeks to five months.

#### ROENTGEN EXAMINATION.

Perhaps the most valuable means of diagnosis of this condition at our disposal, aside from bronchoscopy, is the roentgen examination. It is true that the clinical history, especially the fact of an antecedent tonsillectomy under general anesthesia, is usually sufficient for a diagnosis. When, however, we apply the conventional modes of diagnosis, much remains to be desired as regards the exact localization and extent of the process, and the existence or absence of a cavity and associated changes in the pleura. This hiatus in the diagnostic chain is supplied by the roentgen ray in a surprisingly complete manner, and is well shown by the figures which illustrate this paper.

It will be seen that in each case the plate discloses an infiltration of varying extent which corresponds to a pneumonic process in the lung. The localization of this process to an individual lobe is possible through a knowledge of the position of the roentgen tube with respect to the limits of the lobe. The demonstration of such a pneumonic process taken in conjunction with the clinical history is sufficient for a diagnosis of pulmonary suppuration. It is only by a favorable combination of circumstances that a cavity can be seen, depending on its size and the density of the infiltration in which it is imbedded. In this series of cases a cavity was demonstrated five times, in some cases with a fluid level which shifted on change of position of the patient. But it should be remembered that the discovery of a cavity is not at all necessary for a diagnosis.

The shape of the infiltrated area varies; in some a lobar distribution is evident (Fig. 1). In others one gains the impression of a residual infiltration involving only a small portion of a lobe (Fig. 5). In still others it is almost circular. The infiltration is usually a dense one which is partly attributable at least to the associated pleural thickening. Unless the lower lobe is involved, there is no restriction in the movement of the diaphragm.

When present, cavities are easily recognized as lighter areas of

circular or elliptical shape within the shadow of the infiltrated lung. They are usually small. In 2 cases they were multiple and in two instances were located at the hilus. When they are filled with secretion they may be invisible, but may come to view after a copious expectoration (Figs. 2 and 3). At times roentgen examination performed in the oblique position may disclose a cavity not otherwise seen (Fig. 10).

The process of cure may be accurately followed by the roentgen ray. The infiltration gradually becomes less dense and fades out at its periphery until it finally disappears, leaving perhaps a few thickened strands for some time. Clinical cure may, however, be associated with a persistence of the infiltration as seen in Fig. 7. Whether such cases remain cured or later recrudesce is difficult to say. With a persisting low grade inflammation it is possible that conditions are present for a return of the symptoms.

27 East 95th Street.



## THE ROENTGEN EXAMINATION OF THE APPENDIX.

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By MAXIMILIAN JOHN HUBENY, M. D., of Chicago.

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The diagnosis of chronic appendicitis is still a matter of controversy; however, the roentgen examination has, to a certain extent, eliminated some of the possible errors. While it is the object of the profession to make the work scientific, yet with all the methods now available we are not able to make it absolute.

From the roentgenological standpoint, little need be said of acute appendicitis, excepting that one occasionally might be illumined in a left-sided appendicitis, several such cases having been reported. In such an instance an opaque enema, carefully given during fluoroscopic examination, will show if we have a case of situs inversus.

The bizarre, atypical symptoms in some cases lead to a faulty diagnosis, and after the removal of the appendix, it is found to be uninvolved and the condition of the patient remains as heretofore. The appendix has frequently been removed when the real cause of trouble was a stone in the urinary tract, especially in the lower right ureter, tuberculous peritonitis, tubercular mesenteric glands, painful right inguinal hernia, pleurisy, etc. It is therefore evident that any supplementary knowledge would be welcomed.

The object of this paper is to place confirmatory data in our hands, which, with other clinical findings, warrant a diagnosis of chronic appendicitis.

Holzknicht, Albers-Schœnberg, Bécélère, Jordon, Grœdel, Riedel and other European roentgenologists did some early work on this subject; however, considerable credit must be given some of our American collaborators, notably Cole, Quimby, Imboden, George and Case for appreciating the possibilities of this method of examination.

There are two methods of visualizing the appendix; the first is by injecting an opaque enema; the second by the ingestion of an opaque meal. The second is preferable because of the greater frequency with which the appendix can be demonstrated. In examining the patient the fluoroscopic method is the most satisfactory, and this should be done both in the vertical and horizontal positions.

By proper manipulation an otherwise hidden appendix can be shown; also movability and relationship to the surrounding structures noted. The plate method should also be used, for it occasionally gives additional information. Sometimes stereoscopic

plates are indicated whereby one can trace a retrocecal appendix, or an appendix in close proximity to the cecum or ileum, which might otherwise be overlooked.

It is necessary that the lumen of the appendix be patent. The appendix may not be demonstrated if its lumen is obliterated or if adhesions or kinks are present near the proximal end; or if an acute attack exists, the infiltrated mucous membrane prevents the entrance of the opaque substance. Also an enterolith or previously contained matter may prevent its filling.

The writer has had the experience in several cases in which the first examination failed to reveal the appendix, but a second examination disclosed its presence.

The two possible factors in filling the appendix are antiperistalsis in the ascending colon and sedimentation.

Grødel has recently asserted that every appendix which permits the entrance of an opaque meal is pathologic. However, the more rational assumption is that if the appendix empties itself at the same time that the cecum does, it should not be considered diseased, for Moro has cinematographically demonstrated peristalsis in the appendix of a dog similar to that which exists in the cecum. Cohen says that cecal contents normally enter the appendix; it should, however, be empty when the cecum is empty. He states it may fill and empty itself several times during the same opaque meal.

The time of examination is important, for the appendix commences to fill shortly after the cecum. This is usually after the sixth hour, although there are cases that fill earlier. From this time on until the bowel is empty, and often for several days afterwards, the appendix remains visible. Pirie has reported one case in which the shadow persisted for forty-three days.

Pathologists inform us that the evidences of previous appendiceal inflammations are peritoneal adhesions; obliterations of the whole or portions of its lumen; strictures of the lumen with more or less dilatation distal to it, and lastly the presence of hard concretions which are retained by strictures or produce the same effects as strictures.

Concretions may occasionally be shown. The other factors are inferential from the following information. The visualized appendix with fluoroscopic manipulation will give us (1) the size, including the length and calibre; (2) position and direction; (3) drainage; (4) mobility; (5) kinks; (6) the location of applied pressure to visceral topography. This latter point is quite important, for should pain be constantly elicited by pressing on the appendiceal shadow, one is justified in suspecting its involvement, for seeing palpation is more valuable than palpation without seeing. This often throws light on cases in which anomalous symp-

toms have resulted from the appendix being situated in the pelvis, behind the cecum, or unusually high, when the symptoms may simulate gall-stones or duodenal ulcer.

Fluoroscopically the presence of adhesions in connection with the appendix, terminal ileum and cecum, whether to each other or to the surrounding parts, can often be recognized, especially if they are extensive. If the cecum is in the pelvis it can often be drawn into the right iliac fossa. When this cannot be done, it is impossible to determine whether adhesions are present, as the cecum and appendix are too deep to be palpated satisfactorily unless the colon is distended with air or the bladder is not emptied for ten or twelve hours; sometimes the Trendelenberg position releases a mobile cecum so that the appendix is palpable and visible.

The appendix produces effects on remote organs. The stomach may be hypertonic so that it empties itself rapidly. This is much less frequently observed than with duodenal ulcer. More commonly a spasm occurs in the centre of the stomach. Indeed, chronic appendicitis is, after gastric ulcer, the most frequent cause of spasmodic hour-glass constriction of the stomach. Sometimes pressure over the appendix will produce a spasm; in most cases epigastric discomfort was simultaneously produced. Barclay declares that appendicitis causes an impairment of the ileopyloric reflex, producing appendix dyspepsia. Occasionally we have associated a delayed pylorospasm. Intestinal stasis is sometimes the result of adhesions following a chronically inflamed appendix.

Stasis of the cecum and ascending colon is often due to reflex inhibition resulting from chronic appendicitis. In such cases the cecum and ascending colon are often abnormally large and unusually mobile.

Enterospasm, usually affecting the proximal half of the transverse colon, is sometimes present.

When the appendix hangs over the brim of the pelvis, or when the cecum as well as the appendix is situated in the pelvis, chronic appendicitis may produce dyschezia.

25 E. Washington Street.



## FURTHER NOTES ON THE ROENTGEN DIAGNOSIS OF GALL-STONES.\*

By ARIAL W. GEORGE, M. D., of Boston.

Technique is of prime importance in the roentgen study of gall-stones. First of all, a sufficiently large number of plates must be made of the gall-bladder region. These should be made to vary in density, one from the other, by varying the exposures. I use and recommend screened plates exclusively, using a different intensifying screen with each plate as far as possible to eliminate screen defects, shadows and artefacts of any sort. Screened plates bring out better the gall-bladder and liver shadows than do unscreened plates.

In the well-nourished individual, there is not much difficulty in visualizing the gall-bladder, if pathological; in the poorly nourished, however, it becomes more of a problem. It is to be remembered that the gall-bladder may be found anywhere in the upper right or lower abdominal quadrants and even to the left of the median line.

My cases have grouped themselves into four classes:—

First, dense stones.

Second, stones of very little density (the average gall-stone).

Third, 'suspicious shadows,' and

Fourth, visualized gall-bladder.

Dense gall-stones occur in about 25 to 30 per cent. of the cases. The stones difficult to demonstrate occur in about 60 to 70 per cent. The cases in which I report 'suspicious shadows' may occur in a certain series frequently and on which a negative or positive opinion cannot be passed. The reason for this, I feel, is that the technique in some of the series was not what it should have been for one reason or another.

At the same time, undoubtedly there is a certain percentage of cases in which gall-stones cannot positively be diagnosed roentgenographically because of some other factor than that of technique. I have come to the conclusion that when one can demonstrate a gall-bladder it is pathological. This visualized gall-bladder should be demonstrated on two different days, if possible. I have found more than once that when I could demonstrate only the gall-bladder on the first examination, that on the second day the gall-bladder

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\*Read before the American Roentgen Ray Society at the annual meeting in Atlantic City, New Jersey, September, 1915.

might not be defined, but positive evidence of gall-stones would be found.

My errors in diagnosis for the most part have been due to poor technique or failure to make a sufficient number of plates. Food passing out of the duodenum may be confusing. Calcified glands, cancer of the liver and pancreas, calculi in the kidney and calcification of the costal cartilage may also be sources of error.

Every routine gastro-intestinal examination made by me includes plates (often as many as ten) of the gall-bladder region before any opaque medium is administered. In every case, regardless of gall-bladder symptoms, special attention is paid to the upper right quadrant and the findings recorded. I ask the surgeon who operates for any abdominal lesion to report back whether there is or is not gall-bladder disease. This has given me the opportunity to consider the negative aspect of the roentgen plates.

This negative aspect is of greater value than I had supposed. About 70 per cent. of gall-stones are found in individuals past forty years of age, the majority of whom are well nourished. Because these individuals have had gall-stones over a period of years they are usually hard stones. In some one of the stones in the collection there is enough calcareous material within the core or about the periphery so that it can be demonstrated on the plates.

The difficult cases are those in which the stones are of more recent development, as in individuals from twenty to thirty-five years of age.

I have had a series of 129 operated cases from October 1st, 1914, to September 20th, 1915. I have here considered in detail a series of 54 cases operated upon by eight different surgeons in which I have made a positive or negative diagnosis of gall-stones.

In Series No. 1 of 10 cases, the first 9 were operated upon for various gastro-intestinal lesions. I reported negative findings (gall-stones) on 9. The tenth case was examined for new growth of the colon, which was not found, but in the routine gall-bladder examination two gall-stones of the difficult variety were seen. Four were found at operation. This series has no errors.

In Series No. 2 there were 5 cases. One was negative, 4 were positive. There were no errors. This is a series of cases operated upon by Dr. Samuel Mixter. In the first case the gall-bladder was opened in December, 1914 (not by Dr. Mixter). The roentgen examination, May, 1915, showed one stone in the gall-bladder. Operated by Dr. Mixter, one stone found. Case No. 2, two stones found and proved. Case No. 3, one large stone found and proved. Case No. 4, removal of gall-bladder three years previous to roentgen examination. Roentgen examination showed one soft stone in the common duct. Operated and proved. Case No. 5, clinical diagnosis, gall-bladder or chronic appendix. Roentgen

diagnosis, negative gall-bladder, chronic appendix. Operation proved the gall-bladder negative.

Subsequent to this series one other negative case was operated which I had not included in the series. This was proved negative. The seventh case, not included in the series, operated upon recently. One stone was found by the roentgen examination and two at operation. This was a man weighing 200 lb.; the stone was a quarter of an inch in diameter.

In Series No. 3 of 2 cases, one was negative and one was positive. The positive diagnosis was found to be an error.

In Series No. 4 there was a total of 7 cases. No negative, five positive, and two errors. These two errors were of positive diagnosis.

In Series No. 5 there were 15 cases operated upon for various gastro-intestinal lesions. Thirteen were negative and two were positive with no errors.

In Series No. 6 there were 7 cases. All positive and no errors.

In Series No. 7 there were 3 cases. No negative, three positive, and no errors.

In Series No. 8 there were 5 cases. Five were positive and no errors.

In this series of 54 cases there were twenty-four negative diagnoses and thirty positive with a total of three errors, making the percentage of correct diagnoses ninety-four with an error of six per cent. for the series.

		Negative	Positive	Error	
Series 1.....	10	9	1	0	
Series 2.....	5	1	4	0	
Series 3.....	2	1	1	1	
Series 4.....	7	0	7	2	
Series 5.....	15	13	2	0	
Series 6.....	7	0	7	0	
Series 7.....	3	0	3	0	
Series 8.....	5	0	5	0	
	<hr/> 54 Cases	<hr/> 24	<hr/> 30	<hr/> 3	94% correct
					6% error

It is to be noted that these cases were selected cases and were possibly the object of greater effort, which may possibly account for the high percentage of correct diagnoses.

In a miscellaneous series of 75 cases done earlier than the series noted above, my diagnoses fell into two groups. First, 31 cases which I diagnosed as 'suspicious shadows' in the region of the gall-bladder. In 25 cases the suspicions were verified, 6 were errors. In the remaining 44 cases I gave a 'yes' or 'no' opinion with thirty-five correct diagnoses and nine errors. This makes a total of 120 cases including the special series, with an average of 86 per cent. correct diagnoses and 14 per cent. error. In other words,



111 cases in which I made correct positive or negative diagnoses with 18 cases which were errors. Five other cases which were operated upon subsequently to this series were not included in the above figures with correct diagnoses, all positive.

In closing, I am impressed more than ever by the negative value of the roentgen examination for gall-stones. It is noteworthy that in the selected cases the percentage of errors was low. In the general series the percentage was higher. This is explained by the fact that this was pioneer work and again a matter of technique.

I am still of the opinion that in a series of 100 cases examined as special cases, the percentage of correct diagnoses can be even higher than what I now report. The percentage will depend almost entirely upon the thoroughness of the examination of the individual case. I am convinced that practically all gall-stones can be demonstrated by the roentgen method. That there will be a certain percentage of a series that will not show is unquestioned, but what I understand as classical gall-bladder cases,—in these, I believe gall-stones can be demonstrated whenever present.

43 Bay State Road.

## OBSTRUCTIONS IN THE STOMACH AS SEEN ROENTGENOSCOPICALLY.\*

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By PAUL EISEN, M. D., of Chicago.

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We judge a muscle by its size and shape and quality of its action. In atrophy its fibres are smaller and react slower, whereas they are larger and react more vigorously in hypertrophy. In a *tubular* organ the musculature determines likewise its shape and size, and its degree of activity. The heart is embryologically such a tubular organ. Therefore we judge its normal size and shape and motor action by the width and thickness of the walls of the heart's different muscular chambers and the force of its pulsations. These factors are all clinically measurable and allow us to determine a normal heart. Among the most exact clinical methods is the determination, roentgenoscopically, of the size and outline of the whole heart and the observation of its pulsations.

Likewise with the taking of a contrast giving meal, we can determine, roentgenoscopically, the size and shape and motor activity of the stomach. Forssell shows us how the architecture of the musculature determines the characteristic outline of the lumen of the normal stomach. It is to the credit of Forssell that we recognize the size and shape and motility of the normal stomach.

Forssell considers separately the vertical stomach sac from the horizontal evacuating channel. The sac, divided into the upper third, fornix or dome, the middle body or corpus and the lower third, sinus or pouch, constitutes the food receptacle. At a sharp angle to this large chamber lies the small evacuating channel or *canalis egestorius*. The degree of this angle as well as the width and shape and activity of this canal teaches us to recognize pyloric obstruction. This *canalis egestorius* as seen in a normal roentgenogram is shown herewith (Fig. 1). The patients are of the asthenic type. The evacuating channel is not enlarged in length or breadth; there is no obstruction. The length of the stomach sac is due to relaxation of the entire stomach; the aspect is not that of obstruction. The sphincter action in these stomachs is unimpaired. Should such a relaxed stomach show residue, this would be due to lack of muscular driving force alone, and not to any obstruction at the pyloric sphincter. With such a picture of a normal stomach in mind, it is not difficult to recognize, roentgenoscopically, the change in appearance that the active stomach presents, when obstruction occurs. There are various signs advocating the degree

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\*Read at a Meeting of the Chicago Roentgen Society, November 19th, 1915.

of obstruction. We recognize six roentgenological signs, may the obstruction be at any part of the stomach whatsoever. These signs are (1) narrowing of the lumen; (2) hypertrophy; (3) distention; (4) residue; (5) hypersecretion; (6) empty bowel.

When the obstruction occurs at the pyloric sphincter, it may be temporary and of a spastic nature. During its contraction the sphincter lumen is invisible and its degree of narrowing cannot be judged by its breadth during relaxation. Cole has determined the normal sphincter lumen as measured on the roentgenogram with  $\frac{3}{8}$  in. But sounding and introduction of the surgeon's finger at operation are more reliable methods of measuring the lumen than the width of the lumen as seen roentgenoscopically. In the esophagus this principle has long since been recognized. The failure of the metal olive at the tip of a duodenal tube to pass the pylorus has sometimes been suggestive in our work. The narrowing of the stomach lumen opposite an ulcer or cancer (Fig. 2) may also be largely of a spastic nature, although adhesive bands may add to the degree of narrowing. Lack of gravity in the prone dorsal position likewise leads to an obliteration of the lumen, wherefore we prefer the upright position, unless using the prone ventral posture for certain special reasons; for instance, to demonstrate duodenal ulcers.

Narrowing of the lumen can finally take in the whole stomach in those rare cases of scirrhus cancer or syphilis, converting the stomach into an inflexible tube. Something very similar we often see in emotional patients, where fear and anxiety show primarily a total spasm of the stomach, till verbal reassurance gradually reveals to us a normal stomach. Is the narrowing of the total stomach, however, organic and extreme, then we will invariably see the lower esophagus likewise filled.

When the lumen is not obliterated, as in most organic lesions, the path of the narrowing can be followed through the mass. In these cases it is not always easy to find the pylorus, unless the proximal duodenum is well defined. In lesions set in dogs causing obstruction, the proximal duodenum likewise allows us to determine where the pyloric sphincter is situated. Here also spastic contraction narrows the lumen. Where the lumen is totally impermeable, it is impossible, roentgenologically, to determine the site of the pyloric sphincter. This is evident in the case of acid burn and total obstruction. The approximate location, however, was well determined by following the course and character of the rings of contraction while the stomach was in action.

This leads to the consideration of the second roentgenoscopic sign to determine gastric obstruction—the recognition of hypertrophy. It is seen in infantile congenital stenosis. It becomes evident, roentgenoscopically, when the downward progressing waves start at a higher situated pulsating ring and cut in deeper into





Fig. 1.—Normal stomach in appendicitis.



Fig. 2.—Narrowing of lumen.



Fig. 3.—Hypertrophy.



Fig. 4.—Duodenal ulcer and appendicitis.

the lumen and flow slower than in the normal. At what degree the deviation from the normal begins, can sometimes be difficult to determine even for the more experienced, while the beginner continually believes to be seeing hyperperistalsis. A striking illustration of this phenomenon is given herewith (Fig. 3). The pulsating ring of contraction, being at the lower segment, retraction is here seen in the vertical stomach. The depth of the progressing ring, the peristaltic or, as Cannon would have us say, the catastaltic ring, is very marked. This ring completely obliterated the lumen in the following case of gastric ulcer and appendicitis. Generally, however, hyperperistalsis is not so extreme in appendicitis, or totally absent, but more so in duodenal ulcer where the totally contracted transverse stomach also holds up the pylorus to the right to avoid traction on the ulcer (Fig. 4). Also in duodenal obstruction pylorospasm may be noticeable by the degree of hyperperistalsis. In dogs the hyperperistalsis corresponded well with the hypertrophy of the musculature; and in recent literature I convinced myself of the extraordinary thickness in the musculature of the terminal stomach in a case of duodenal ulcer. In my experience the prevalence of hyperperistalsis was most always corroborated by other dependable signs of obstruction. Of course, in severe cases of obstruction, like the one case mentioned, hyperperistalsis can reach such a severe degree (*Stenosen-peristalsis*, Schwarz calls it), that the stomach is fairly bi-located. In these cases the peristalsis is visible under the abdominal skin and the patient becomes conscious of its occurrence. Here we also see reversed peristalsis or anastalsis. It is only the roentgenoscopic illustration of a well-known and well-described clinical sign of obstruction. However, the certainty of the clinician cannot compare with that of the roentgenologist in his observation, as the clinician often cannot rule out the participation of the bowel.

Soon after or with the appearance of hyperperistalsis, a progressive distention of the stomach-parts this side of the obstruction becomes evident. This was very convincing even in the aforementioned cases of pylorospasm, likewise in a case of cholecystitis where the evacuating channel alone became distended. The more severe the obstruction (gastric ulcer with snail-like involution of lesser curvature), the greater the distention. The further the pylorus is pushed to the right, the broader the evacuating channel becomes. The further distant from the pylorus the obstruction occurs, the more the vertical stomach participates in the expansion, until we see in extreme cases even the fornix widening out to the left. This direction to the left is given naturally by the lines of support in the distribution of the muscular fibres. This expansion is shown beautifully in dogs, in whom a lesion has been set, causing obstruction.

In cases of temporary obstruction at the pylorus caused by



spasm, a six-hour residue of the corn-starch cream meal we give (1/3 oz. starch, 3 oz. cream, 3 oz. Ba., and water to make up a good pint and a half) does not necessarily occur, or occurs one day and not the next. Therefore small residues are inconclusive. However, a pylorospasm can cause quite a considerable residue of one-third volume. To avoid all misunderstanding, it must here be said that peristalsis drives the food back into the stomach—sorts it. Only when the pyloric sphincter relaxes, does food escape into the duodenum—a chemical reflex action. However, if we have a very large residue, we have as dependable a sign roentgenoscopically as the clinical method; and we know well how both can be at variance with the actual condition. Mistakes will always occur, but large statistics like those of Haudek and Carman cannot be ignored. Personally I prefer to see both methods agree before coming to a conclusion. And even then we are often misled. In severe obstruction even the residue backs up into the fornix. When this occurs, however, we must always have hypersecretion with regurgitation, singultus and vomiting. The secretion is seen reaching up to the diaphragm. This roentgenoscopical sign of hypersecretion is indisputable, when reaching the extreme degree.

The sixth and last roentgenoscopic evidence of obstruction is recognized by the roentgenologist with greater certainty than by the clinician—the empty bowel. If the bowel is empty a few hours after the meal, this becomes extremely suspicious. If no food passes within six hours, then we know we will find an empty bowel twelve and twenty-four hours after the meal. We have complete obstruction. One such case I showed before.

Lastly when we have, as has been demonstrated, a multiplicity of obstructions, say hour-glass stomach due to gastric ulcer and duodenal ulcer combined, or volvulus, the roentgenoscopic evidence of a bilocular obstruction is superior to any other clinical method. These, however, are rare cases, and like those where the stomach is displaced through a diaphragmatic hernia into the thorax, are more curiosities than daily occurrences.

In the youthful days of roentgenoscopy great stress was laid upon the determination of the lower border of the stomach. Since we know through Forssell's study that it is a natural tendency of the sinus ventriculi to stretch, we no longer pay any attention to this sign. I have repeatedly seen stomachs, whose lower border was at even height with the symphysis pubis, reveal themselves at operation as nothing else but relaxed stomachs without obstruction, and show, after repair operation, their former lower border. On the other hand, we can demonstrate roentgenoscopically the most severe obstruction in stomachs lying directly under the diaphragm or held up by new growths and adhesions. I have neither mentioned intragastric polypus tumors nor hair-balls, acting like a valve and

in this way possibly causing obstruction, although both have been demonstrated roentgenoscopically. The nature of the obstruction can be manifold. We can often determine it, but in all doubtful cases we would better confine ourselves to describing only what we actually see, without making too vague a guess as to what it may or may not be.

In the North Chicago Hospital our method of examination of digestive disorders is in the following manner. The usual clinical as well as roentgenological examination is carried out independently by the members of the staff. At the regular morning conference with Drs. Carl and Emil Beck, the findings, if any, are reported. In this way many practically normal cases are examined, merely to rule out any suspicion. If, however, any tangible facts are disclosed, the case is again examined, and if the findings by the different members are corroborated, the case is operated in the presence of all the staff members and the operative findings compared and later discussed. In this way there is a coordination of the different methods of examination, by which not only the staff members but especially the patients profit.

In conclusion I may state that in all our cases showing obstruction at operation, our different clinical and roentgenological findings were in accord. By working in harmony, our examination becomes of scientific value.

#### DISCUSSION.

By LEOPOLD FRANKEL, M. D., North Chicago Hospital.

Instead of discussing every point of the very interesting paper of Dr. Eisen, I will confine myself to the question of pyloric stenosis and obstruction from the clinical point of view.

Any clinician, trying to make a diagnosis in diseases of the alimentary canal without consulting the roentgenologist, would make many mistakes and would deprive his patients of the benefit of the roentgen examinations. I have especially in mind two pathological conditions—callous ulcer and hour-glass contraction.

Both are organic lesions; both require surgical interference. Only the *x-ray* plates will verify the diagnosis in the former, and in the latter will find the pathologic lesion, which the clinician has not even suspected.

Obstruction of the pylorus can be diagnosed with our clinical methods, which in a great number of cases are able to determine the exact nature of the lesion, whether benign or malignant.

The clinical picture characteristic of pyloric stenosis and obstruction consists of (1) functional symptoms; (2) physical signs; (3) chemical signs; (4) general changes.

The functional symptoms consist of pain and vomiting. Both symptoms are very frequent in all types of stomach diseases, and so characteristic in pyloric obstruction that conclusions are easily drawn from their occurrence. The pain is due to contractions of the stomach, which try to drive the food through the obstructed pylorus into the intestines. The pain is very severe, of colic nature, appearing three to four hours after taking food, increasing in intensity; and finally the food not being able to pass the pylorus, the

stomach evacuates itself through the esophagus in form of vomitus; at this moment the stomach stops contracting and the pain suddenly disappears.

In the beginning of the evolution of the stenosis, the musculature of the stomach hypertrophies; later, according to the general rules of pathology in all hollow muscular organs, the stomach becomes dilated. As the stenosis progresses, the vomitus occurs more often and becomes more copious, because the distended stomach contains several meals and the product of hypersecretion. The vomitus itself is also very characteristic; it contains visible remnants of food taken several days previous. Another prominent point of the vomitus is the fetid odor caused by the presence of fermentative acids.

Physical signs consist in the clearly visible stomach outline through the thin abdominal wall, while the abdomen below it is retracted.

The other phenomenon is peristaltic waves going from the cardia towards the pylorus.

Superficial splashing sounds can be produced on fasting stomach or several hours after the taking of food.

Percussion of the stomach reveals the lower border of the stomach several fingerbreadths below the umbilicus and often in the region of the symphysis.

We determine the chemical part by passing the stomach tube into the fasting stomach and find considerable liquid with macroscopically visible remnants of food. Free HCl is noted, as is also yeast cells, *sarcinæ*, which are characteristic of benign lesions. The absence of free hydrochloric acid, the presence of lactic acid and Boas-Oppler bacilli is characteristic of malignancy.

Finally there are general changes, such as progressive loss of weight, obstinate constipation, extreme thirst, oliguria, because water is absorbed from the bowels only.

For determination of the total or partial pyloric obstruction, I am using the Einhorn thread method. The patient swallows, in the evening, the thread mentioned above, which is attached to a small bucket, and is withdrawn next morning. In case of nontotal obstruction, the thread next to the bucket will always be stained with bile, which regurgitates through the pyloric opening. Absence of bile stain on the thread is, in my opinion, an absolute, positive sign of total obstruction of the pylorus.

In order to avoid confusion, I will mention briefly that according to the modern functional examinations of the stomach, insufficiency or stagnation occurs only in organic lesions, rarely in cases of simple atony.

In conclusion, I may say that in pyloric occlusion it is fortunate that the absolute diagnosis can be made either by clinical methods or roentgen examination.



## MODERN RADIOTHERAPY.

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Radiotherapy in its up to date development offers quite a few problems the solution of which would mean the greatest advance in the fight against malignant tumors.

It is an established fact among the competent and experienced workers in this field that in some cases astonishing results are obtained, that in other cases one may justly speak of encouraging results, and that in the greater number of cases failures have to be recorded. At the same time it has to be admitted that even among the ranks of conservative and reliable observers great differences are to be noticed as to the percentage of successes and of failures.

What are the reasons for these clinical differences and in what directions has further research to be pointed in order to reduce the percentage of failures? At first enters the matter of equipment. It is generally conceded that real efficiency in these cases is secured by the use of hard filtered rays. That means that only a certain quantity of the originally produced rays will reach the object of the application, while with the interpolation of heavier filters this quantity will still be diminished *pro rata*.

Therefore only *x*-ray tubes may be employed to advantage which not only are originally hard tubes, but must also be qualified to emanate a quantity of rays sufficient to attack the tumor even under heavy filtration.

This item does not only depend upon the construction of the tube, but also on the apparatus that furnishes the current and the way the current is forced through the tube. The tube must not only be hard, but also must permit a sufficient ampèreage to go through, and it must be possible to maintain the tube constant during action. It furthermore must be taken into consideration that each tube has an individual maximum optimum as to its distance from the tumor to be rayed and that this factor has also to be taken into the calculation.

Experience has shown that the best results are obtained by massive doses, that is that not only the greatest possible quantity of rays is thrown into the tumor, but that each seance will extend over a length of time that would have been thought prohibited in former days.

This became possible by our modern system of filtration and

skin protection. Another item of importance is the fact that a proper tuning up of the whole apparatus by proper usage tends toward highest efficiency. In order to ensure that the tube answers all these demands it is not sufficient to test it before employment, but also to be in a position to gauge it at every moment during action in order to correct deviations or even to exchange the tube if becoming insufficient.

The tube must be tested previously to employment as to hardness, optimal distance, penetration, and quantity of produced rays, and during action must be watched as to constancy and ampèrage. Hardness of the tube is measured by electrometers built after Bauer's principle; penetration and optimal distance by penetrometer and iontometer. It cannot be sufficiently emphasized that all photometric tests are absolutely inadequate in testing a tube as to its therapeutic qualifications.

As to the employment of radioactive substances, it seems that more and more the pendulum is swinging in favor of mesothorium in preference to radium. European observers of large experience as to material and time report their best results in the sense above quoted. It seems now that a quantity of from 50 to 100 mgrm. of mesothorium is accepted as the standard amount, while heavy filtration is generally accepted. Here also the technique of application is paramount. The best results are obtained if appropriate containers are built for the various organs, thus enabling the operator to place the mesothorium to best advantage.

I am convinced that the superiority in results as reported by European observers is based on their refined and varied technique of application.

As to the different clinical responsiveness of tumors not to be differentiated by clinical and microscopical investigation, there are two ways of trying to improve our results.

One is to increase the efficiency of our sources of rays, especially as to penetration, but there are limitations to that; we therefore must try to introduce materials into the tumor or into the organ carrying the tumor, that under the influence of raying will emanate secondary rays of a character similar to the primary rays, thus extending the penetration *ad libitum*. Experiments in this direction are carried on with great zeal and seem to offer some encouragement. Secondly, it seems advantageous to destroy the bulk of the tumor previously to the raying without incurring any danger of dissemination, and for this purpose the diathermy seems to offer great opportunities. Finally we must endeavor to prevent the establishment of metastases; for this purpose the embodiment of extracts of malignant tumors is employed. In order to make tumors more responsive and more susceptible to the influence of rays, the ideal way would be to sensitize the tumor cells by prepara-

tory treatments. So far all attempts to accomplish this by producing hyperemia by heating and so on did not prove successful, and it seems that the only solution may be found in the discovery of some chemotactic agent that will answer this purpose.

It becomes evident that results will be obtained and improved by a combination of radiotherapy with surgical interference of proper qualification and by maintaining the resistance of the whole system by appropriate medical attention.

If radiotherapy were of no other value, this at least is conceded by all authors of experience—it has proved to be so far the sovereign method of handling inoperable cases of malignancy.



## A MODERN X-RAY LABORATORY.

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The term 'X-Ray Laboratory' is an unfortunate expression, but it has become established by common usage and will probably remain. It is applied indiscriminately to the largest plants as well as to a one-room office containing a high frequency coil. An 'X-Ray Laboratory' should mean a place which is fully equipped to do scientific *x-ray* work in all its branches. Such laboratories naturally fall into two classes—namely, the roentgen department of a hospital and the private offices of the roentgenologist. The equipment should be the same in both cases, but fewer rooms are required in an institution, unless the director has his headquarters there and patients come in from the outside.

The purpose of this article is to describe a private laboratory, embodying all the modern ideas and yet small enough to be managed by the physician and one or more assistants. If the offices are situated in a building with other physicians having an attendant in common to receive patients and answer telephones, one assistant who is also a stenographer will usually suffice. This, however, is an individual matter depending upon the amount of detail work the roentgenologist wishes to do himself and the number of cases seen. An ideal force consists of a stenographer, an office nurse, who also acts as an assistant, and a technician for the dark-room work.

As an *x-ray* laboratory requires a large amount of floor space and a special arrangement of the rooms, it is usually impossible to get a location that meets the requirements without extensive changes. An ideal layout can only be secured in a building designed for the purpose, but in a good location the cost would be prohibitive, or the rental too high. In most cities there is a tendency for the men in special work to congregate in one neighborhood, which is usually an old residence district. This necessitates remodeling old houses; and unless the laboratory is planned at the time the changes are being made, it is very difficult to secure an efficient arrangement. The writer was fortunate in securing a lease in a building which was to undergo a regeneration; and as the changes made were more extensive than usual in such cases, the plan described below was obtained (Fig. 1).

The planning of an *x-ray* laboratory must be on modern efficiency lines. The patients must be handled with a minimum of

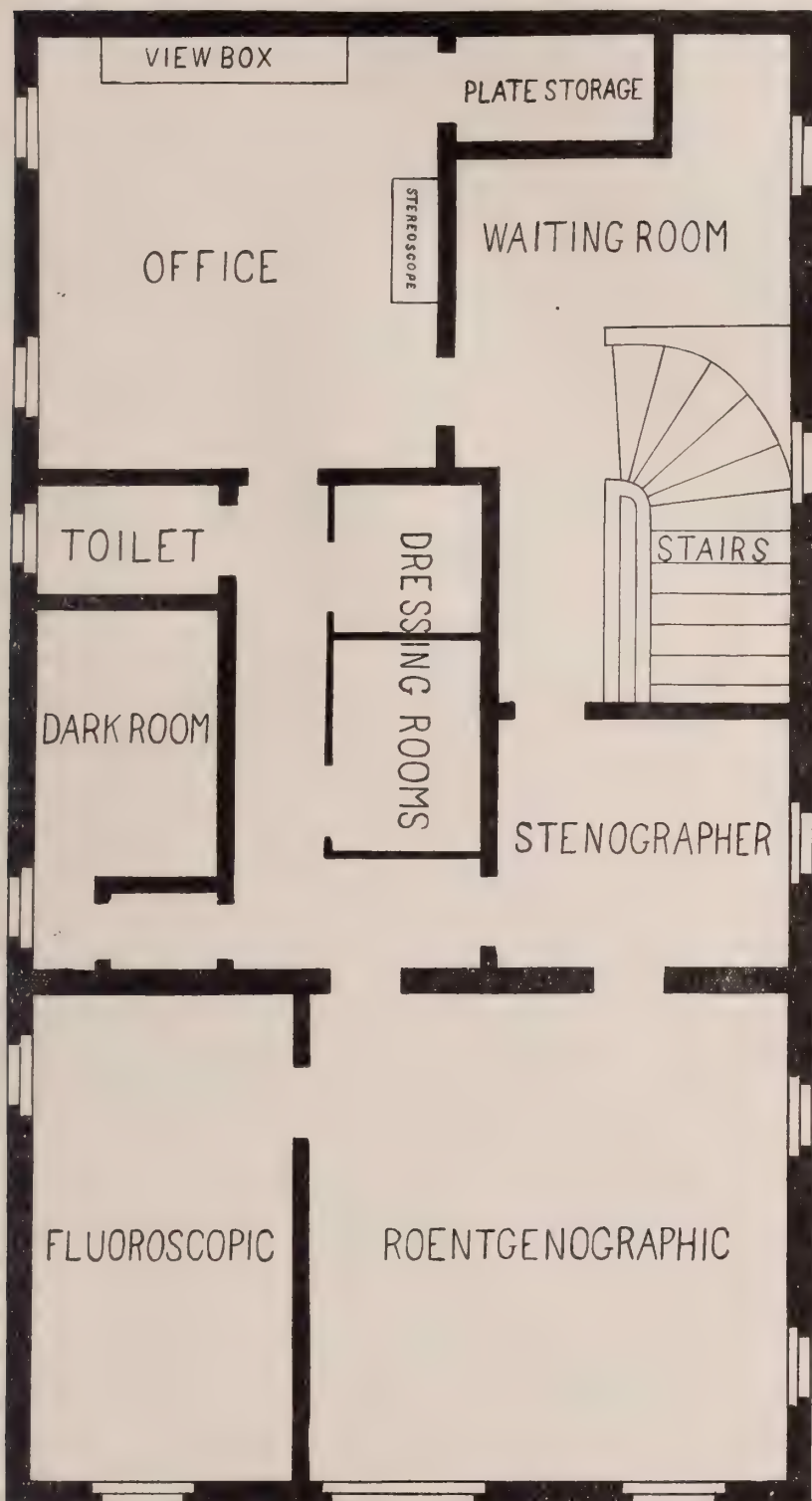


Fig. 1.—Floor plan of x-ray laboratory showing arrangement of rooms.

'doubling back' and the necessary movements concentrated to a central point. The work-rooms must be in close proximity, not only to save steps but to economize time. The dressing-rooms and toilet must have perfect privacy and yet be in immediate touch with the work-rooms. A private office is a necessity and should be far enough removed to insure quiet and yet be of easy access to the working unit.

The rooms fall naturally into three classes: The reception unit consisting of waiting- and dressing-rooms and toilet, the work unit consisting of the roentgenographic, fluoroscopic and dark rooms, and the consultation unit consisting of the private office.

The reception unit deals with the reception and preparation of patients for examination. Two dressing-rooms are provided, one

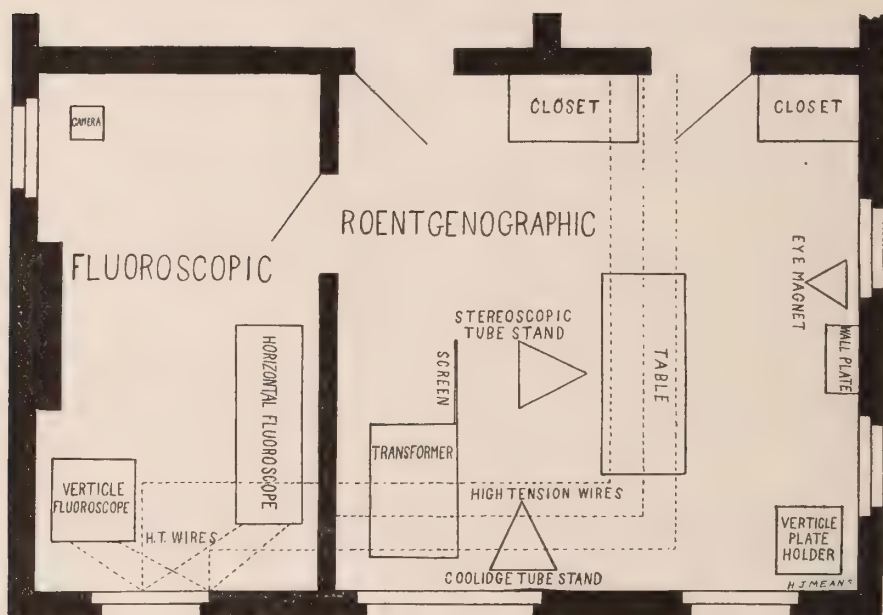


Fig. 2.—Details of roentgenographic and fluoroscopic rooms showing location of apparatus and high tension wiring system.

containing a couch for the use of patients who desire to rest. They open into a private corridor at one end of which is the toilet, insuring absolute privacy.

The equipment and arrangement of the roentgenographic and fluoroscopic rooms will be described in detail as they are the heart of the laboratory (Fig. 2). The first essential is a good power plant and this should be a transformer powerful enough to meet the heaviest demands. The modern machines can be used for treatment and fluoroscopic work, obviating the use of an induction coil which is a nuisance.



An automatic time-switch is an essential part of the transformer, as many of the exposures are made in small fractions of a second. It is impossible to follow a uniform technique if reliance is placed upon counting seconds and manipulating the switch by hand. With a good time-switch of which there are several on the market, an exposure table can be worked out and uniform results obtained.

A supply of tungsten target *x*-ray tubes should be kept and, when a good one is found for one class of work, it should be treasured. There are several combination tube stands and tables on the market which are very efficient. The writer prefers a stereoscopic tube stand of a well-known make and a special table with a firm upholstered top. The ordinary stereoscopic table is extremely uncomfortable to lie on for more than a few minutes. A piece of heavy sheet steel under the plate will obviate any danger of breakage, and the patient can lie in comfort.

Any tube stand affording proper protection will answer the purpose for ordinary roentgenographic work; stereoscopic work, however, is so important that a stand embodying this principle should be provided. The protection given by the ordinary lead glass bowl is insufficient for the Coolidge tube. This tube can only be used with safety in a specially constructed lead lined box which completely encloses it.

An apparatus for the localization of foreign bodies in the eye is a necessary part of the equipment. There are two types of this machine, both evolved by Dr. Sweet, of Philadelphia. The original form is comparatively inexpensive, but depends too much upon the personal equation of the operator; the improved form is mathematically correct and reduces the chances of error to a minimum. In no branch of roentgenology are the results of a mistake so disastrous, and this work should not be attempted without the proper instrument. A powerful electro-magnet should be provided for the use of the oculist and will be found very useful in removing foreign bodies in other parts of the body.

The fluoroscopic room contains both vertical and horizontal fluoroscopes. This room can be completely darkened, and has both a blue and a white light in the ceiling controlled by separate switches. As it is often desirable to photograph patients, a camera is placed at one end of the room and lantern slides are also made there.

The transformer serves both the tube stands and fluoroscopes. The overhead high tension lines are interrupted over the machine and the current is thrown into either room as desired. This reduces the leakage to a minimum, as with the entire system live a great loss would result.

The wires are led into the fluoroscopic room and the current is

directed to either machine at will; the fluoroscope not in use being dead.

The transformer is controlled from the fluoroscopes by a foot switch, and only a few seconds are necessary for the assistant to change the switches for plate work.

The dark room contains a large sink in which the developing tanks stand and shelves for various purposes such as unexposed plates, trays, chemicals, and intensifying screens. Every roentgenologist has his own ideas about dark-room arrangement and equipment so that a detailed description is unnecessary. It requires an arrangement, however, that will permit of doing the work in the easiest and most convenient way.

The choice of *x*-ray apparatus is largely a matter of geography. There are several good transformers on the market made by reputable manufacturers, any of which will give good results in competent hands. All things being equal, the purchaser should choose the machine made nearest to him. The most carefully made apparatus may go bad occasionally, and the question of service becomes very important, as a delay of one day in a busy office means a large financial loss.

Some firms have a monopoly on certain accessories and others make a product far superior to their competitors. In purchasing tube stands, fluoroscopes, time-switches, etc., only the best of its type for the work to be done should be obtained. These pieces of apparatus do not break down like a transformer and can be repaired with comparative ease, whereas when the transformer is out of commission everything comes to a standstill.

To summarize, a modern *x*-ray laboratory consists of

1. Roentgenographic, fluoroscopic and dark rooms.
2. Waiting- and dressing-rooms.
3. Private offices and plate storage.

Equipment.

- (a) Powerful transformer.
- (b) Stereoscopic tube stand and tubes.
- (c) Coolidge tube and stand.
- (d) Table and vertical plate holder.
- (e) Vertical and horizontal fluoroscopes.
- (f) Eye localization apparatus and magnet.
- (g) Stereoscope and illuminating boxes.

## SIMPLE ROENTGEN ACCESSORIES.

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AN ACCESSORY SINUS ANGLE FINDER.—Law (*Amer. Jour. Roent.*, 1915, Vol. II, Nos. 8, 9, 10, p. 833). In order to obtain a satisfactory anteroposterior image of all the accessory sinuses at one exposure, it is necessary that the rays pass through the head at a certain angle. The proper angle is one which will cause the shadow of the petrous portion to cut across the lower one-third of the orbit. To obtain this position the principal ray must be directed through the head at an angle of  $23^{\circ}$  from a line extending from the external auditory meatus to the glabella. This angle may be obtained by a pair of dividers or a permanent triangle set at an angle of  $23^{\circ}$ . The tip of the angle finder is placed opposite the glabella, the left arm passing across the external auditory meatus, the right arm extending upward alongside the cone and representing the direction of the principal ray. The cone is now brought in alignment with the arm of the finder and brought down onto the head, making firm pressure. There are cases in which this angle will prove to be incorrect, but it works out very satisfactorily in the majority. Most all compression cones are made of metal and attached to a metal tube stand. This makes the necessary pressure for satisfactory sinus exposures painful to the patient, and necessitates insulating the stand. To obviate this, a simple addition is made to the cone by splitting lengthwise a piece of one-half inch rubber tubing cut to the circumference of the base of the cone, fitting this over the metal edge and fastening in place with a lacing of cord across the two ends. This makes a soft pad to make pressure on the head and insulates the end of the cone from the head.

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### ROENTGEN ITEMS.

#### GLOVES FOR USE IN ROENTGEN-RAY WORK.

Dr. Mauclaire, agrégé professor at the Faculté de médecine de Paris and surgeon of the hospitals, showed the Société de chirurgie de Paris some gloves which are very pliable and are impermeable to roentgen rays. The solution which is easily removed with benzine, is composed as follows:—

Solution of caoutchouc.....	50 grm.
Benzine. . . . .	50 grm.
Lead carbonate .....	100 grm.

The gloves after receiving four coats of this solution on their inner side, are sterilized by being placed for an hour in alcohol. This does not alter the coating.



## EPITOME OF CURRENT ROENTGENOLOGICAL LITERATURE.

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ROENTGEN TREATMENT OF DEEP-SEATED CANCER.—Case (*The Physician and Surgeon*, 1915, Vol. XXXVII, pp. 442-449). *Superficial Lesions*.—The roentgentherapy of superficial carcinoma has been well established as a successful means of dealing with most of the uncomplicated malignant lesions involving the surface of the body. It is probably not an overstatement to declare that at the present time roentgentherapy is superior to operative procedure in most cases of superficial carcinoma. The less favorable cases are those where there is deep-seated ulceration with involvement of the neighboring glands, cartilage or mucous membrane. In the latter class of cases, a very thorough-going preliminary pre-operative roentgenization should be administered, the harder rays being applied through a moderate amount of filtration in order to effect the deeper structures. The dose should be carefully measured to make sure it is adequate, yet not too large; after which, on the ninth or tenth day, a radical operation should be done, followed ten days later by another *x*-ray treatment. Further *x*-ray irradiation should be followed out just as though the lesion were still there and we depending entirely upon *x*-ray therapy to overcome it. By thus combining roentgentherapy with surgical intervention, one is most likely to insure good results in these complicated superficial lesions.

*Deep-Seated Lesions*.—The technique of irradiation has been much improved by the adoption of the cross-fire methods and the practice of filtration. Cross-fire irradiation is the term applied to the method by which one passes a bundle of rays of high penetration through the different surfaces of the skin which surround the region under treatment; for instance, the anterior, posterior and lateral aspects of the trunk if one is irradiating an abdominal tumor, or the anterior, posterior and lateral aspects of the neck in the treatment of goitre. The amount of effective rays which reach the deeper tissues is increased as many times as there are ports of entry. In certain locations where the skin overlying the organ is very loose, it is possible, by sliding the skin about, to deliver several doses directly over the organ under treatment without overtreating any section of the skin. Inasmuch as the intensity of the *x*-rays varies inversely with the square of the distance of the anode to the part under fire, with a shorter focus-skin distance it is evident that the tube being brought nearer to the skin, the length of time required to deliver a certain dosage to a deep-lying structure will be proportionately diminished. For instance, with a tube 14 in. from the skin ( $14^2=196$ ), nearly five and one-half times longer will be required to deliver a certain dosage to the skin than when the focus-skin distance is only six inches ( $6^2=36$ ). In the *x*-ray treatment of malignant tumors, it is especially important to avoid inadequate treatment, for insufficient irradiation is likely to pro-

voke more rapid growth through irritation instead of the intended destruction. Malignant cases should receive from the start full doses, which means at least ten X units every three weeks, if the lesion be a superficial one, and at least twenty X units if a more deeply seated lesion receives filtered doses. By a full dose we refer to that quantity of rays a given skin area can tolerate without developing a dermatitis. This full dose means the amount of ray necessary to produce five H units on the Holzknecht scale or ten units on the Kienboeck scale, five H and ten X being equivalent terms when speaking of filtered rays. Our experience has shown that when a filter of three millimeters of aluminum is employed and the result is measured underneath the filter, this dose can be doubled, twenty X units being tolerated by the skin during each three weeks' period. The writer employs at least 3 or 4 mm. of aluminum plus a thickness of sole leather as a filter in most of his deep roentgentherapeutic work; and sometimes the thickness of aluminum is increased to 7 or 8 mm. Shall operable carcinoma be treated by irradiation or operative means? The results which have thus far followed roentgentherapy of deep-seated malignant affections do not yet warrant us in believing that roentgentherapy affords a means of cure in these deep-seated lesions. In the light of our present knowledge, it may be stated as an axiom that the *x*-ray method should never replace or in any way interfere with the surgical treatment of cancer. It may be summarized that in addition to postoperative treatment, roentgenology is indicated when the tumor is inoperable, as in the presence of extensive metastasis, or when other factors preclude the possibility of an operation. It is possible to effect improvements, to cause isolated nodules to disappear, and others to shrink; but in the light of our present experience, we are justified in expecting definite cures; and in dealing with such a disease as carcinoma which has a pronounced tendency to metastasis and continuous proliferation, we must be content with prolonging the patient's life while at the same time making his existence tolerable. The pain is usually relieved or mitigated, occasionally the tumor is reduced in size, offensive odors are avoided, and the fatal consequences of carcinoma are postponed so that in many cases the end comes through some quicker, more merciful, intermittent affection.

*Postoperative Roentgenization.*—While we receive with great scepticism reports of apparent cures following *x*-ray treatment of deep-seated malignancies, and while we therefore must urge that all operable tumors should be surgically removed, the good palliative results which have followed the *x*-ray treatment of recurrences and inoperable cases surely warrant the adoption of postoperative *x*-ray treatment as a routine in malignant cases.

*Preoperative Roentgenization.*—The writer has for some time adopted the plan of administering a preoperative as well as a postoperative treatment. Even cases which are apparently operable have received, eight or ten days before the operation, cross-fire filtered rays given in full dose to as many areas as possible. By the eighth or tenth day, theoretically, at least, the smaller lymphatic channels have shriveled up as a result of the intensive irradiations, thus diminishing the chance of cutting through infected channels at the time of the operative interference, which is now undertaken. Ten days later (that is, three weeks after the initial preoperative roentgenization and ten days after the operation), the patient is

again sent to the *x*-ray room and further series of treatments administered, as though the tumor was still present in its entirety.

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THE SAFE INTERPRETATION OF ROENTGENOGRAMS OF THE GALL-BLADDER REGION.—Caldwell (*Amer. Jour. Roent.*, 1915, Vol. II, Nos. 8, 9, 10, p. 816). It is quite certain that with the many useful tricks of technique, which are now well known, we can demonstrate a larger percentage of gall-stones than was possible a few years ago. It is desirable to make a large number of plates with different angles of incident rays, at different stages of the respiratory circle, and with rays of different degree of penetration. The use of a diaphragm is indispensable, and compression is often useful. Compression with a cylindrical tube carrying a small film that can be crowded deeply into the abdomen, as advocated by Selby and others, may be useful. Filling the colon with gas or air to obtain a gall-bladder shadow over the gas is occasionally successful. Short exposures with powerful apparatus are best. Stereoscopic plates are often indispensable. Direct fluoroscopic examination with palpation under the screen often gives information that cannot be obtained with plates. By this method the mobility of the pylorus and duodenum can be investigated, tender spots can be located definitely with reference to the bismuth-filled duodenum, deformities in outline and position of the duodenum due to gall-bladder adhesions can be shown better on plates and fluorescent screen. It is important to have the best possible arrangements for illuminating *x*-ray plates when they are examined. A mercury arc, such as the Cooper-Hewitt lamp gives excellent illumination, and a good north light is also good. Both enlarging and reducing lenses may be used with advantage in studying plates. A reflecting prism stereoscope is a convenient and valuable accessory. It is very easy to make a roentgen diagnosis of gall-stones. The difficult thing, just now, is to avoid making such a diagnosis occasionally, when no stones are present.

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GASTROPTOSIS.—Hertz (*Arch. Rad.*, 1915, Vol. XX, pp. 143-148). *Gastroptosis* is often diagnosed without considering sufficiently whether it can be the cause of the symptoms which are present. It is, in fact, an incomplete diagnosis, as it is necessary to know whether the ptosis is present in the erect position only or also on lying down, whether it gives rise to duodenal kinking, and, if so, to what degree stasis results, before an accurate prognosis can be given and a rational line of treatment instituted. The object of this paper is to show briefly how an *x*-ray examination of the stomach can give accurate information on these points.

*Orthostatic gastroptosis* is the condition present when the lesser curvature of the stomach, as seen with the *x*-rays after a standard barium meal, is below the umbilicus in the erect position, but the greater curvature is above the umbilicus in the horizontal position.

*Complete gastroptosis* is present when the stomach is not only abnormally low in the erect position, but the greater curvature also reaches below the umbilicus in the horizontal position.

After having determined the position of the stomach and duodenum in the erect and horizontal positions, it is next necessary to observe whether the stomach is able to evacuate its contents in a normal manner. If the duodenum drops with the stomach, the passage of food out of the stomach and through the duodenum is



generally normal in rate. This is also sometimes the case even if the duodenum has not dropped; but in the majority of cases, especially if the ptosis is well marked, it can then be seen with the *x*-rays that although the food may pass without difficulty from the stomach into the first part of the duodenum, there is delay in the passage beyond this point. Similar observations must be made lying down; in many cases it will be found, especially if atony is also present, that the greater part of the stomach drops to the left side of the spine, so that nothing at all passes into the duodenum so long as the patient lies flat on his back, but as soon as he lies on his right side food passes without difficulty into and through the duodenum, unless a severe degree of complete gastropptosis is associated with a duodenum in the normal position.

A second examination should be made six hours after the opaque

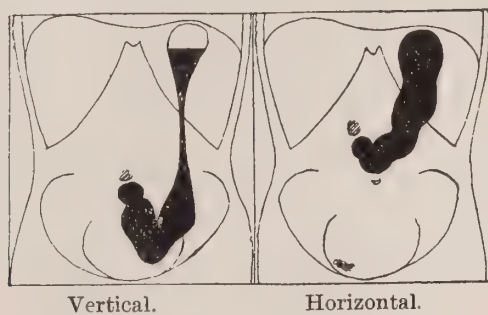


Fig. 1.—Orthostatic gastropptosis.

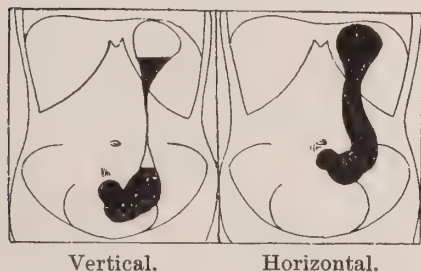


Fig. 2.—Complete gastropptosis.

meal, no food having been taken in the interval. The patient should not lie down, but should follow his ordinary occupation until the second examination is made. Gastric stasis is present if the stomach still contains food at this second examination. In order to decide whether this is due to the ptosis or to some complication, such as organic obstruction of the pylorus, a second opaque meal should be given on another day, and the patient should lie on his right side in the interval between the two examinations. If the ptosis is the sole cause of the stasis, the stomach will be empty in six hours, and if an intermediate examination is made it will probably be found to be already empty in three or four hours.

It is important to observe whether voluntary contraction of the abdominal muscles in the erect position is sufficient to raise the

stomach to its normal position, since if this is the case the prognosis is good, and abdominal exercises and massage, together with the temporary use of an abdominal support, will probably result in a cure. If the stomach cannot be raised to the normal position in this way, the back should be supported by the left hand whilst the lower part of the abdomen is pressed inwards and upwards with the right hand. In most cases this results in raising the stomach to the normal position, which indicates that an abdominal support is likely to give relief to symptoms, though it will not by itself cure the condition.

An attempt should be made to find out in what position the stomach empties itself most efficiently, as this is the position the patient should, if possible, assume during and after meals. In most cases the best position is for the patient to lie on his right side with his body slightly raised by being supported on his right elbow. In cases of complete gastropotosis it may be necessary to raise the pelvis, and this would indicate that rest in bed with the foot of the bed raised is required. In severe cases of complete gastropotosis a masseuse should be present at the examination, so that she can see by what manipulations under the fluorescent screen she can raise the stomach to the normal position, as this should be done regularly every day as part of the treatment, the patient being strictly confined to the recumbent position.

When an abdominal support has been ordered with the object of holding the stomach in normal position, an *x*-ray examination should be made to see whether it really does so. Anyone who is not familiar with such *x*-ray examination, will be surprised to find how rarely an abdominal support is efficient, but by the addition of pneumatic or porous rubber pads it is possible in many, but by no means all, cases to hold the stomach in normal position.

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ALUMINUM FILTER FOR DENTAL RADIOGRAPHY.—Nodine (*Dental Cosmos*, May, 1915). Investigations in the field of dental radiography by Dailey have suggested the use of aluminum or silver to filter out the secondary rays. He has proposed that a sheet of aluminum or silver one-sixteenth of an inch thick or less (about 1 mm.) be inserted at the circular opening of the diaphragm, the aperture in the tube shield holder through which the *x*-rays pass. The efficiency of other metals for this purpose is also being investigated.

It has been demonstrated that the use either of aluminum or silver filters results in clearer negatives with greatest definition and more uniform results. The crossing of the secondary rays, which hitherto have produced dark and opaque areas in the negative, are also eliminated. These dark and opaque areas, it has also been suggested, are produced by the phosphorescing of the sodium and other salts in the media through which the secondary rays pass. Further, this effect may take place either in the solid or soft tissues. In other words, the fixed salts and the salts in solution are affected by the phosphorescent or phosphorizing action of the secondary rays, which in turn affect the negative.

## BOOK REVIEWS.

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THE ROENTGEN DIAGNOSIS OF SURGICAL LESIONS OF THE GASTRO-INTESTINAL TRACT. By Arial W. George, M. D., Assistant Professor of the Department of Roentgenology, Tufts College Medical School, etc. etc. and Ralph D. Leonard, A. B., M. D., Assistant in the Roentgen Department of the Boston City Hospital, etc. etc. Three Hundred and Six Pages, Including Seven Three-Color Illustrations, Eighteen Artist's Drawings, Three Hundred and Forty-Three Roentgen Plate Reproductions. Boston: The Colonial Medical Press. 1915. Price, \$10.00.

This truly beautiful atlas is all that the preliminary outline promised. It is a crowning acknowledgment of the value of roentgenology in gastro-intestinal diagnosis. The bold courage of the authors in asserting the absolute-ness of positive roentgen findings is substantiated by the proved cases recorded in this volume. There may be many unacquainted with roentgen advances who will find fault with the authors' seemingly untenable assurance and confidence; but if these quibblers will take the time and exhibit patience in the perusal of this masterpiece of roentgen literature, they will gain great knowledge. Even well-informed roentgenologists may accuse the authors of an unreasonable enthusiasm, but to them there should be the same answer: "Save your prejudices until after a careful reading and your prejudices will turn to praise."

There is no doubt that this book establishes the supremacy of the American methods in gastro-intestinal roentgenology. The authors acknowledge that their inspiration comes from Cole's serial roentgenographic method. The temerity of those using this method to argue their roentgen findings against a seemingly uncorroborating clinical picture is turning the neglect of clinicians into a respect for roentgen evidence. When roentgenologists will return a positive diagnosis without any clinical history, it is truly revolutionary. This elaborate volume certainly adds flames to the revolution. It will be inspiring to the physician and surgeon and create confidence in the roentgenologist to read and digest the remarkable series of roentgen diagnoses collected in this interesting volume.

The contents are arranged in nine sections, each one profusely illustrated with remarkably distinct reproductions of the original plates. There are 18 artist's sketches and 17 colored plates. The section upon the normal stomach carries 35 roentgen illustrations; gastric ulcer provides 48 illustrated case reports, gastric new growth provides 38 plates; the duodenum is described and illustrated by 64 plates with additional sketches and colored plates; gall-stones are shown upon 38 plates, beautifully reproduced; pathology of the small intestines and appendix occasion 76 plates. The large intestine in three sections—Adhesions, New Growth and Diverticulitis—is amply illustrated in 43 roentgen plates.

The text is not elaborate, but the descriptions of technique and the principles of direct roentgenography are ample though trite. The study of the plates is facilitated by a brief key system.

The makeup of the book is as revolutionary as its contents. Truly the young Turk of medicine was in the combative blood of the authors. The roentgen world should be in a receptive mood for an atlas like George and Leonard's. It outranks Grashey's atlases of the roentgen skeleton.

There are Iron Crosses for soldiers, monuments for statesmen, Nobel prizes for various activities. What are the public acknowledgments to medical authors? Fame in a limited world—yes! But the greatest return for such a revolutionary effort as this book is the gratitude of a world of suffering humanity, who will reap the benefits of this catalogued roentgen knowledge.

Roentgenologists will praise, surgeons will assimilate, and internists will welcome this masterpiece in roentgen literature.

DIE ZAHNÄRZTLICHE ROENTGENOLOGIE. By Dr. J. Reinmøller und Dr. Burchard. 209 pages, 53 illustrations, 78 roentgenograms upon 13 photographic pages. Leipzig: Verlag der Dyschen Buchhandlung. 1914. Price, 11.80 m.

This textbook and atlas for dentists and students is the second volume of the dental series put out by the Dyschen Buchhandlung at Leipzig. One is



immediately impressed with the beautiful atlas appendix of actual photographic reproductions of dental films and plates. The tooth films are reproduced in actual sizes, but the sinus plates are reduced one-half to one-third. Their reproductions are exquisite in detail and eminently satisfactory for study.

The first 120 pages are taken up by complete details of roentgen installations for dentists, including ample descriptions of the technique of intraoral and extraoral dental exposures. Thirty-four pages are devoted to this roentgen dental technique which is a fair sample of the sensible division of space which characterizes this commendable publication. Sixty pages offer interpretative information under eleven subheadings.

There is one unusual chapter carrying a frank discussion upon the choice and purchase of individual dental x-ray outfits. The choice of coil or interruptless apparatus is largely a matter of economy or volume of work. Large clinics naturally require interruptless outfits, but the author recommends coil apparatus for the more simple dental installations. No doubt the author is unfamiliar with the small American interruptless outfits which are proving so satisfactory in dental work. The author contends that it will not be economical or favor efficiency if the dentist installs his own roentgen apparatus for taking possibly three to five films daily. Such a small amount of work can be referred more satisfactorily and economically to a roentgen laboratory.

The nomenclature of the chapters on interpretation of dental pathology is distinctly scientific. The term *granuloma* has supplanted the familiar 'apical abscess.' There is the evident purpose to describe pathological conditions about the teeth in terms which coincide with a physician's understanding of bone pathology. For years dentists have rather side-stepped pathological study for the mechanical proficiency necessary to successful dentistry. The mechanical restoration of the remains of a tooth has fascinated the dentist almost to the exclusion of a sane consideration of the tolerance of the bone about such a root.

Roentgen films are furnishing spectacular evidence of the shortcomings of this ambitious mechanical dentistry. It would almost seem that the modern interest which physicians display in securing healthy tooth sockets is about to force the dentist to consider the tolerance of the alveolar processes to these clever mechanical devices.

This small volume carries much evidence of the pathological consequences dependent upon dental mechanics applied without a conception of dental pathology. These dental roentgenograms surely carry a message to dentists and they also furnish the roentgenologist with a good interpretative knowledge of dental pathology.

**STEREOROENTGENOGRAPHY—PULMONARY TUBERCULOSIS.** By Kennon Dunham, M. D. Troy, N. Y.: The Southworth Company. 1915. Price, \$13.75.

This beautiful volume containing 42 pair of stereoroentgenograms of normal and abnormal chests is the result of several years of applied effort by Kennon Dunham, of Cincinnati. We have been familiar with the values of Dunham's studies for several years, but this volume placed upon record for all time the magnitude of his service to pulmonary roentgenology. He offers the tangible proof that the tree-like shadows upon the normal chest plate are caused by blood-vessels, bronchi and connective-tissue, of which the latter is the most important. Again, he carefully describes and illustrates the characteristic variations which occur in tuberculosis. Dunham, with remarkable perspicacity, arranges the relative value of stereoroentgenograms and fluoroscopy thus: "The use of the x-ray with the fluoroscope, which presents an evanescent image, is of great value in the study of moving parts, but, like all previous work along this line, gives us nothing tangible for renewed study and comparison. It is an observation, not a record."

Stereoroentgenograms are records and not observations. Palpation, percussion, auscultation and fluoroscopy are observations, not records, and vary greatly, not only in different men, but in the same man at different times. Dunham's descriptions of pulmonary stereoroentgenograms is wonderfully illuminating. He has gone into the details of these tuberculous and non-tuberculous chest pictures so as to make it possible not only for an x-ray man, but for every physician interested in chest examinations to understand these photographic reproductions. The list of 42 cases is divided into 5 classes: Non-tuberculous, 2; tuberculous, 29; diseases differentiated from tuberculosis, 9; experimental, 4. These reproductions are similar to the reduced photographic stereoroentgenograms in the companion publica-

tion by Dr. James T. Case on the "Alimentary Tract." They are new to American roentgen literature, the German *Fortschritte* having used them for years. Such publications as this by Dunham should have the hearty support of the studious element in the profession. Both roentgenologist and internist will profit by the array of definite information which Dunham offers.

**DAS ROENTGENVERFAHRENS IN DER LARYNGOLOGIE.** By Dr. M. Weingaertner, Assistant an der Kgl. Universitäts Klinik und Poliklinik fuer Hals und Nasenkrankheiten, Berlin. Mit einem Vorwort von Geh. Med.-Rat Prof. Dr. Killian, Berlin. 101 Text Pages with 56 Figures Upon 8 Photographic Inserts, 8 Figures in the Text and 8 Stereoscopic Roentgenograms. Volume 8 of the Bibliothek der physikalisch-medizinischen Techniken, Edited by Heinz Bauer. Berlin: Verlag von Herman Meusser. 1914.

This contribution by Weingaertner seeks to establish the practical value and successful scope of roentgen rays in laryngology. It is well illustrated with actual photographic reductions among which there are 8 pair of stereoroentgenograms. The author divides his subject under five headings: Anatomy, Physiology, Pathology, Foreign Bodies and Therapy. There are also eleven pages carrying a complete bibliography of previous roentgen literature in this specialty.

The introduction by Killian is unusually complimentary to the ability of the roentgenologist to assist the laryngologist. As Killian says, the wildest dreams of the laryngologist have come true, and to the examinations by external signs and the internal use of the bronchoscope we now add transverse inspection. Where formerly the bronchial topography had to be studied in autopsy specimens, now one can by fluoroscope and stereoroentgenograms study far better the living individual.

Weingaertner has entered into most intimate descriptions of the limited portion of the anatomy, and it is regrettable that American roentgenologists are not afforded a translation. There have been several other similar publications in German by Scheier and E. Fränkel, but this has hardly been touched in American literature. We refer more especially to the roentgen study of the voice, speech, respiration and deglutition. Tuberculosis of the lungs is not discussed in this little volume. It seems that every primary and secondary disease of the larynx or bronchial tree which interests the laryngologist receives ample treatment. Only one fault is apparent, and this is the failure of the author to provide headings or divisions anywhere in the book. To find an index reference, one must scan the pages indicated.

This book is one of the roentgen series which Heinz Bauer was editing at the time of his death. They are all compact, well-illustrated volumes and each one worthy of a translation, especially the volumes by Groedel upon the Heart, and Reyher upon Pediatric Roentgenology.

**PERORAL ENDOSCOPY AND LARYNGEAL SURGERY.** By Chevalier Jackson, M. D., Professor of Laryngology, University of Pittsburgh; Consulting Laryngologist, Bronchoscopist, Esophagoscopist and Gastroscopist, Western Pennsylvania Hospital; Laryngologist, Presbyterian Hospital, etc. etc. First edition. Quarto volume of 705 pages, 490 illustrations and 6 colored plates. St. Louis: The Laryngoscope Co. 1915. Price, \$5.00.

The profession has been awaiting this book for some time. Dr. Chevalier Jackson is so well known for his remarkably capable endoscopic ability that this descriptive publication upon his own methods, instruments and technique will find a welcome reception.

To speak of this book as a complete treatise upon endoscopy and laryngeal surgery is warranted by the fact that the great quarto volume of 705 pages is entirely devoted to a text upon the title alone. For instance, the author has refrained from filling or adding pages upon symptoms and diagnosis, except as they illuminate the peroral endoscopic text.

There are 46 chapters. One notices ample and unusual discussion upon anesthesia for Peroral Endoscopy, Bronchoscopic Oxygen Insufflation, Acquiring Skill, Unsuccessful Cases of Bronchoscopy, Pleuroscopy, Decannulation After Cure of Chronic Laryngeal Stenosis, Technique of Laryngectomy. These are unusual headings of chapters culled from the array of conventional chapter titles which such a book naturally presents when bronchoscopic, esophagoscopic, gastroscopic and laryngoscopic methods are concerned. In the middle of the book there is an illustrated table of hardware, jewelry, ammunition, buttons, pins, safety pins, coins, bones, meat, seeds, nuts, shells, minerals and dental objects to the number of 365, which the author has encountered in the pursuit of this precise specialty. Following this are about 20 roentgenograms of

cases, illustrating the localization of foreign bodies awaiting endoscopic pursuit.

The book is beautifully printed and the illustrations are all that could be desired. To those who are at all busy with bronchoscopy or esophagoscopy this book becomes a necessary possession. It will be fascinatingly instructive to every physician by reason of the illuminating text upon this venturesome specialty.

LEITFADEN DES ROENTGENVERFAHRENS FUER DAS ROENTGENOLOGISCHE HILFSPERSONAL. By Dr. R. Fuerstenan, Dr. M. Immelman und Dr. J. Schuetze. 389 pages with 281 illustrations. Stuttgart: Verlag von F. Enke. 1914. Price, 13.20 m.

This volume deals entirely with the technique of roentgenology and is essentially for laboratory assistants. It is a new departure in roentgen literature.

In Germany there are trade schools for roentgen assistants. This vocation is a trade or occupation like an electrician or photographer. After taking a course in one of these roentgen schools the student becomes an apprentice in a roentgen laboratory and develops into an accomplished technician capable of handling the various mechanical activities necessary to produce roentgenograms for the inspection and interpretation by the physician-roentgenologist.

All the information gathered between the covers of this book may be found elsewhere, but it is arranged and expressed in a manner easily understood by the novice. It must not be assumed that this book is superficial—quite the contrary. It is marvelously complete and understandable.

In the first place, 120 pages are devoted to high-tension apparatus including the measurement of roentgen rays. Then 60 pages are given to roentgen anatomy; 40 pages to the exposure room, therapy room and dark room; 50 pages to the technique of exposure positions; 30 pages to photographic processes; 20 pages to the intricacies of roentgen therapy, etc. The illustrations are profuse and afford the student great help in understanding the text.

As related before, this book contains nothing distinctly new, but if every assistant in American laboratories could have such a book as this constantly at hand there would be more expeditious handling of patients and less necessity for reiteration of directions. The reviewer's assistant remarked after the inspection of this volume, "Why is not something like this published in English?"

No doubt everything in this book has already been published in the American journals, but never has there been such a splendid collection of technical information.



# SUPPLEMENT

ON

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Book Reviews.

## THE ROENTGEN RAY STUDY OF THE ESOPHAGUS.

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By I. SETH HIRSCH, M. D., of New York,

Professor of Roentgenology, Post-Graduate Medical School and Hospital,  
Director Roentgen Laboratory, Bellevue Hospital, New York.

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*Technical.*—For the proper examination of the esophagus with the roentgen ray, it is necessary not only to insert into its lumen a substance impermeable to the ray, but also by a certain orientation of tube, patient and screen, to transilluminate the chest so as to separate the triangular median shadow (which is a conglomeration of the shadows of the sternum, spinal column, heart, aorta, mediastinal contents and esophagus) into its component parts.

The sagittal view of the thorax, either dorsoventral or ventrodorsal, is of but little direct value in the esophageal examination.

In the oblique examination of the thorax, the subject is so turned that the tube is either ventrally to the right or left, or dorsally to the right or left of the median line, the ray thus passing through the thorax at any angle of about 30 or 45°. Generally speaking, the esophagus is best examined with the ray passing through the chest in the ventrodorsal direction, the tube being placed in front and to the right, and the screen posteriorly and to the left.

This is the first ventrodorsal position of Holzknecht. For the very lowest portion of the gullet the second oblique is employed as later described. For the upper portion of the esophagus a clearer and sharper picture may be obtained with the ray passing through the chest dorsoventrally, the patient being placed, as has been pointed out, as a fencer stands when in position. The tube is behind and to the left of the median line on the level of the fourth dorsal vertebra, while the screen is in front to the right. This is the first dorsoventral position of Holzknecht and is perhaps the most practical one.

## ANALYSIS OF THE OBLIQUE VIEW.

The pictures obtained in the oblique views are a little more complicated than the sagittal pictures. They are indispensable in the study of the mediastinum and its contents.

The left pulmonic field is divided into three parts. There is the retrosternal field, bounded in front by the shadow of the sternum and ribs, and behind by the left border of the heart shadow, formed by three curves, the upper due to the ascending aorta, the middle due to the pulmonary artery and auricle, and the lower

belonging to the ventricle. Between the heart and the spine is a part of the retrocardiac field, bounded on the right by the posterior border of the heart shadow which consists of two curves, the upper formed by the aorta and the lower by the auricle. This field is between the heart shadow and the spine and is divided into two parts by the shadow of the esophagus, and is brilliantly illuminated in its lower part—dark in its median part, due to the position of the lung hilus, while the upper part above the arch shows as a bright field.

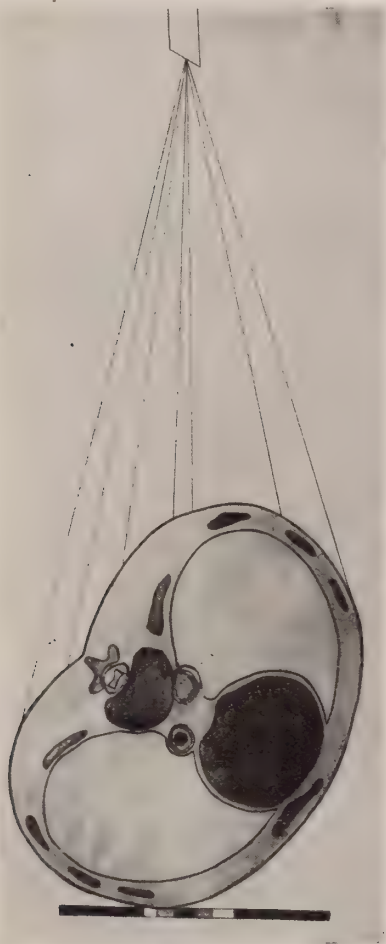


Fig. 1.—Diagrammatic representation, dorsoventral 1st oblique position.

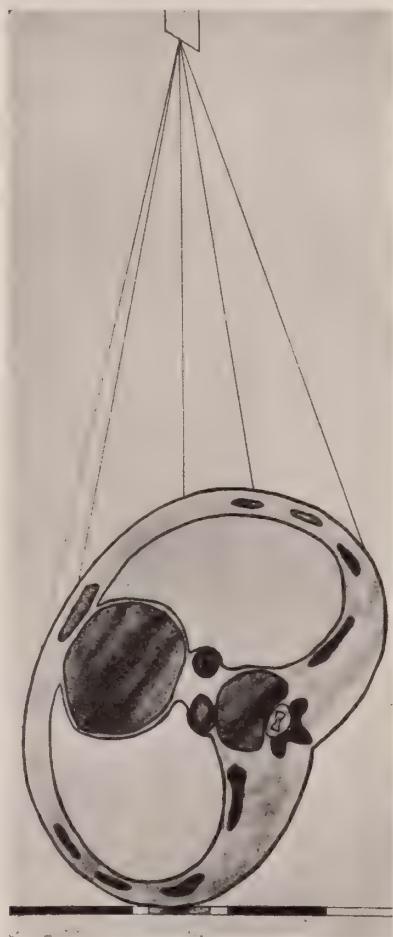


Fig. 2.—Diagrammatic representation, ventrodorsal 1st oblique.

On the other side of the shadow of the spine is the foreshortened right pulmonic field. If this field is considered as a part of the fluoroscopic picture, then the oblique view of the chest may be considered to give three pulmonic fields, the middle field being the retrocardiac space, in contradistinction to the sagittal view, which gives two fields.



Normally the upper part of the gullet shadow is crossed by the shadow of the arch of the aorta and the lower part lies in close apposition to the right heart. Occasionally, with an enlargement of the right auricle, the heart may deviate or overlap the esophageal shadow. The brightness of the retrocardiac field may be obscured by tumor growths, infiltrations and congestions of the thoracic structures. In cases of obstruction the esophagus may be discerned even without bismuth because of the contrast of the watery contents against the bright pulmonic field.

The strip of pulmonic field between the lower part of the esopha-



Fig. 3.—Normal radiographic view of esophagus. Ventrodorsal 1st oblique, tracing from plate.



Fig. 5.—Variation in outline due to peristalsis. Ventrodorsal 1st oblique. See radiogram Fig. 4.

gus and the spine is as a rule clearly illuminated and the shadow of the thoracic aorta is visible therein. This shadow, however, usually overlaps the innermost boundary of this space which is formed by the spinal column, the intervertebral discs of which appear as light areas.

#### ESOPHAGUS IN OBLIQUE VIEW.

Normally, in the oblique view, the esophagus is seen to extend downward from the apex of the pulmonic field in a wide curve which deviates from the curve of the spinal column. In a rough way the esophageal outline may be divided into four curves, the supra-aortic, the aortic, the infra-aortic and the auricular. These curves are more or less accentuated depending upon the filling and disten-

tion of the esophagus. It is to be borne in mind that this description appertains only to the radiological appearance in a normal oblique view. The first curve is the result of the curve anteriorly of the upper vertebral column in the sagittal plane. Then there is a deviation to the right in the coronal plane in the median line at the fifth dorsal, below this point a deviation to the left and forward to the diaphragmatic opening to enter the cardia of the stomach. Radiographically the supra-aortic curve is convex anteriorly; the aortic is concave anteriorly and corresponds to the point where the aortic arch projects into this shadow; the infra-aortic curve is convex anteriorly; and the auricular curve is a wide one, conforming to the curve of the right chamber of the heart. Below, the shadow of the tube enters that of the diaphragm, not at its highest part, but in the posterior portion of the left dome.

The aortic indentation of the esophageal shadow while seen in all cases, is more marked in elderly individuals.

In the frontal view the shadow of the esophagus is visible in its upper part lying close against the spinal column, descending through the middle of the retrocardiac space, but bending forward at the level of the ninth vertebra toward the heart shadow. That frontal screen picture is clearest and best which is obtained with the screen or plate at the left side of the chest.

#### CONTRAST METHODS.

Until recently the esophagus was outlined for this examination by the insertion into its lumen of sounds, bougies, rubber tubes filled with shot, chains, by inflation of rubber bags filled with bismuth, etc. The disadvantages and limitations of these methods, however, are so evident as to make it unnecessary to dwell upon them at length. Aside from the discomfort to the patient and the difficulty of the examination because of the restlessness and gagging, the procedure is not without a certain danger, in the presence of aneurysm or dilated aorta or diseased heart. These methods give no information regarding the nature of the stenosis and do not permit a diagnosis of early lesions. Nor are the methods recently advanced by Bassler (closure of the cardia and distention with bismuth) nor of Crump (the insertion into the tube of sausage skin and bismuth) of any value whatever except to determine absolute stenosis. Besides this, they are crude and the manipulations cumbersome. These methods are faulty because it is just this overdistention of a distensible tube (a property the esophagus has to a great degree) which tends to obliterate all the finer differences in the caliber of the lumen and in muscular tone, making impossible the study of the functional activity of the gullet. It is objectionable, also, on the grounds which make all instrumentation in the gullet

objectionable. Then, too, for the successful accomplishment of this procedure, chlorotone, lubrichondrin and cocaine are often necessary.

#### CONTRAST MIXTURES.

The far preferable method is the simple bismuth examination which gives all the information necessary without any inconvenience to the patient. This method is harmless and satisfactory and, though now almost universally employed, needs but the modification of the contrast mixture suggested, to make it the only method to be utilized. With the proper mixture, properly administered, the position, course, outline, structure and peristalsis of the esophagus may be successfully studied in every case and results obtained which make the examination by inflation with rubber bags and sausage skin unnecessary.

Rarely, even in the worst cases of dysphagia and regurgitation if the mixture has been properly prepared, is any difficulty encountered in swallowing sufficient to outline the gullet. There is no necessity of administering large quantities of bismuth or of giving it in heavy food stuffs. When this is done the tube is so distended as to obscure the fine shadows and markings. One quarter to one teaspoonful of the mixture, prepared as will be described later on, is usually sufficient to outline the entire tube without distortion, and permits the definition of such lesions as are discerned with difficulty, or entirely overlooked, when large quantities of bismuth mixture are administered.

The method adapted by some observers who use the simple bismuth method, is first to administer a bismuth suspension in water; then, if no stenosis is detected, a mixture of the denser consistency is given, and finally a thick bismuth paste. Should this be arrested at a certain point, a mouthful of water is swallowed. If the water carries the paste into the stomach, the presence of a lesion is considered improbable. Occasionally a capsule is administered and its actual arrest tested by a mouthful of water. These and similar methods are faulty. The capsule method in particular, aside from the danger of making a partial stenosis complete, is likely to give erroneous results; for it may be held at the cardiac orifice for as long as fifteen minutes in a normal esophagus, and even the administration of water may not dislodge it. Then, too, by these methods the diagnosis of incipient lesions cannot be made.

A simple and more efficient method is the administration of bismuth acacia mixture, of such consistency as to, so to speak, paint the tube. This consistency is obtained by mixing a heaping tablespoonful of bismuth subnitrate or subcarbonate with one teaspoonful of mucilage acacia and stirring continually for about ten minutes until a syrupy fluid results. This has sufficient viscosity to coat and



paint the esophageal wall and sufficient density clearly to outline its lumen, and because of its small bulk to outline it without distortion. A normal esophageal mucous membrane will rid itself of its coating in a few minutes, but this bismuth paint will adhere to any defect or irregularity in the wall. By this method, irregularities in the lumen of the tube may be studied and delineated, and it is possible to detect not only a slight stenosis, but even the details of an invading growth.

Then, too, for the study of the function of the esophagus a small bolus with single swallows is essential because in drinking large quantities rapidly, the entire esophagus remains relaxed to the last swallow.

#### FLUOROSCOPIC EXAMINATION.

The examination of the esophagus is essentially a fluoroscopic examination. An examination of the entire chest is first made, all precautions being taken to insure a proper fluoroscopy, such as sensitizing the eye, the use of a ray of proper penetration, etc. The patient is examined in the standing or sitting position, the ray passing through the chest first in the dorsoventral direction. The pulmonic fields are studied, particularly hilum shadows, and infiltrations noted. The diaphragmatic action is observed. The size, shape, position and outline of the cardiac and aortic shadows are studied and enlargements or deviations noted. The effacement of the normal curves of the heart and vascular shadows and their replacement by straight lines, with an increase in the width and a diminution in motility of the median shadow, is strongly suggestive of mediastinal tumor; a bulging of the aortic shadow to the right of the aneurysm,—of the ascending arch; to the left,—of the descending arch; the change in the outline of the right heart border so that it resembles the left with an obliteration of the cardiohepatic angle,—of pericardial effusion.

The employment of a revolvable chair will facilitate the examination in the oblique position and permit a thorough scrutiny of the chest from every point of view. The patient is then rotated in the first oblique position and the aorta is studied in order to detect the presence of small aneurysmal tumors. In fact, no diagnosis of a small aneurysm is justified unless examination in the oblique position is made. The examination is continued by turning the patient, so that the chest is seen in all oblique positions.

The preliminary examination being complete, the patient is then placed in the first oblique position, and such orientation of screen and patient is made as to give the sharpest and clearest and largest picture of the retrocardiac portion of the left pulmonic field. The bismuth acacia mixture is now administered and the patient is instructed not to swallow this until the signal is given. When the

screen picture of the retrocardiac space has again become clearly and sharply defined, the signal is given, the patient swallows the mixture—and its passage downward through the esophagus is noted. After the first general glance, because of the rapidity of the movement of the bolus, successive portions of the tube from mouth to cardia should be studied with a slit diaphragm. The sequence of the movements which comprise the act of swallowing, the forcing backward of the bolus into the pharynx, the elevation of the larynx, the opening of the upper ostium may be studied. Peristaltic waves may be initiated at will, by requesting the patient to swallow.

The movements of that portion of the esophagus below the seventh dorsal vertebra, transmitted to it by the heart, should be noted. These are normal in the middle and lower, but in the upper dorsal mean pressure of an aneurysm or dilated aorta. Fluoroscopy is absolutely essential for the diagnosis and the magnification of the esophageal shadow by the withdrawal of the screen one or two feet from the patient and the use of the diaphragm is very helpful. Details of the esophageal wall and lumen may be made out which by the ordinary examination may be overlooked. With the screen thus withdrawn from the patient and the field diaphragmed, the patient is rotated by an assistant until the area suspected is scrutinized in every oblique.

#### ROENTGENOGRAPHIC EXAMINATION.

When, by orientation, such a fluoroscopic picture is obtained as best demonstrates the pathological condition, the current is for a moment turned off, the sensitive plate is placed in front of the fluoroscopic screen, against the body of the patient, and instantaneous exposure is made after the patient has made a swallowing effort. The advantages of this method of examination, which employs the fluoroscopic screen in the same manner as one uses the finder on a camera, are numerous. Not only does a plate so made best demonstrate the conditions, but it permits the examiner to note whether or not the exposure has been sufficient and correct. The vertical position is also obviously the position which gives the truest pictures of the condition.

It is important in the examination of the esophagus to study the lowest portion of the tube during inspiration and expiration, and in the radiographing of the esophagus to make the exposure during deep inspiration, as then the flattening of the diaphragmatic dome permits the lowest portion of the tube to be clearly defined. It is an advantage also to have the tube opposite the upper dorsal vertebrae in order that the oblique rays may depress the diaphragmatic shadow and delineate the very lowest part of the tube. By inflation of the stomach with bicarbonate of soda and tartaric acid, the

left lobe of the liver is displaced and a bright area may be obtained, in which the epicardiac portion of the gullet may be made very clearly visible by examination in the second oblique. Occasionally in deviations or diverticula, the sagittal views are valuable for comparison. For the examination of the cervical esophagus, the head is turned to the left, the trunk being in the first oblique, but the ordinary sagittal dorsoventral view should also be utilized.

*Deglutition.*—Two periods in the act of swallowing, the buco-pharyngeal and the esophageal may be differentiated. The bolus, having been moulded in the mouth, is brought to the required consistency, carried into the pharynx and hypopharynx and pushed



Fig. 25.—Photo-syphilitic sclerosis of stomach with enormously dilated esophagus.

into the esophagus with great rapidity and force. With the relaxation of the esophagus opening, the bolus enters and is carried by peristaltic activity through the esophagus. Both the voluntary and involuntary part of the act of deglutition should be studied. Solid food is carried down solely by peristalsis, while liquids are ejected from the pharyngo-esophageal junction to the cardia. Hence, the importance of a contrast media of the proper consistency and thorough and absolute suspension. Frequently in semifluid media, the dark bolus glides swiftly through the brightly illuminated retro-cardiac field to the lower part of the tube before any evidence of peristalsis is seen. If the passage to the stomach were free, no further muscular activity would be required. But there is at the



epicardia not only the physiological narrow point and a twisting of the esophageal mucous membrane folds through an angle of ninety degrees, but also an evident sphincteric action which must be overcome by peristaltic activity, and thus it is that the wave is deepest and most active in this part.

Cinematographic studies have shown that it is apparently necessary that the upper esophageal orifice be closed if the contents of the esophagus are to enter the stomach and that there is regurgitation, if the closure does not take place. Regurgitation may also occur if there is failure of relaxation of the epicardial sphincter. The tone of the esophagus at the gastric end not only varies normally in different but in the same individuals, but is always maintained under normal conditions. Complete relaxation of the epicardial esophagus does not take place unless the tube is specially and forcibly stretched as in therapeutic procedures or as a result of extensive malignant disease of the lower half of the gullet. The epicardia closes with every individualized swallowing act, and only when large quantities are swallowed rapidly does the epicardiac portion of the tube remain partially relaxed for any length of time. A bolus swallowed in the inverted posture (standing on head) initiates active esophageal peristalsis with a forcing of the bolus to the epicardia, but when the peristaltic wave finishes its course and diastole occurs, the bolus falls rapidly back through gravity to the upper part of the gullet but not back into the pharynx, proving the existence of a sphincteric action at the upper pharyngeal mouth of the esophagus.

The act of vomiting also calls into play the coordinating action of the upper and lower sphincters. There is a forcing of the gastric contents into the gullet, a sharp contraction usually in the middle portion of the esophagus, then a relaxation of the pharyngeal mouth and an ejection of the contents, while the gullet below the point of constriction fills for a repetition of the act. The site of the spastic contraction is either in the middle or in the lower third of the tube.

Normally the passage of a teaspoonful of very fluid bismuth mixture takes from one to two seconds to reach the diaphragmatic end from the upper portion of the esophagus, but the entire act of swallowing takes from five to seven seconds. The estimation must be made with the bismuth thoroughly suspended, because rapid sedimentation takes place in the mouth and the fluid may get into the stomach and not be visible—the contrasting part of the bolus arriving later. Besides the hesitation at the diaphragm which is always present as is also moderate distention of this portion of the gullet, there is also some hesitation in the middle portion of the tube opposite the seventh dorsal in normal individuals. After the first swallowing effort in a normal case no peristalsis takes place

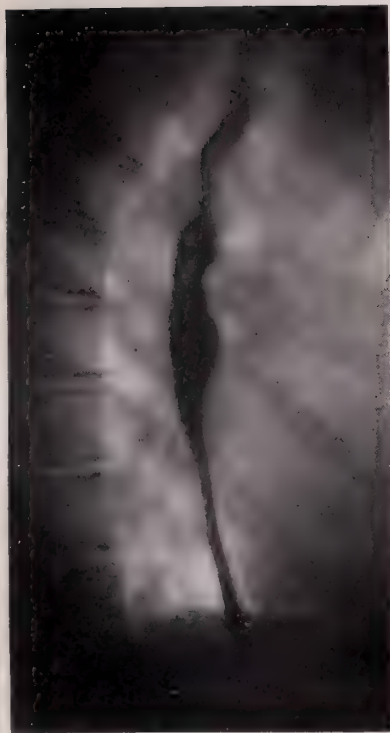


Fig. 4.

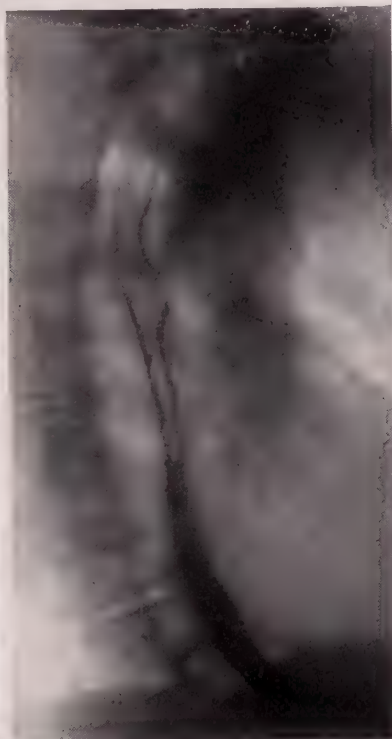


Fig. 6.

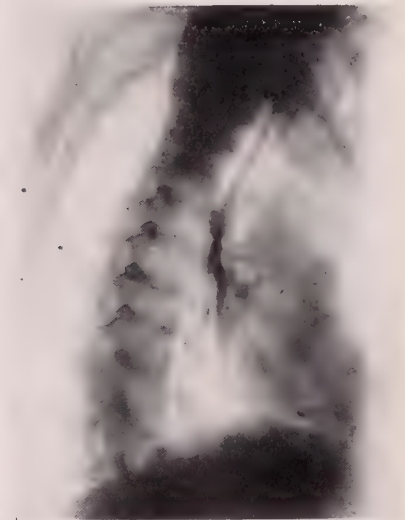


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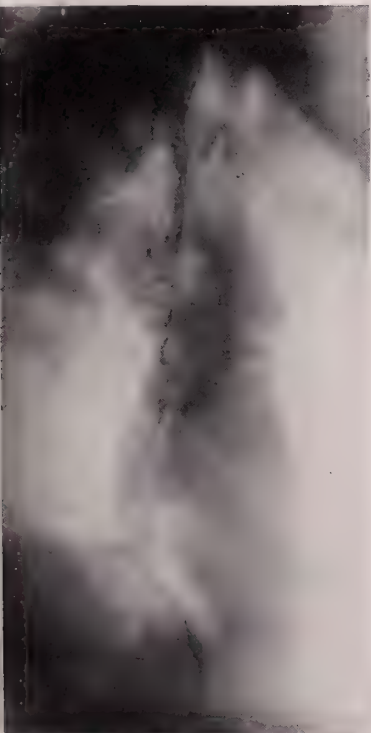


Fig. 8.



Fig. 9.

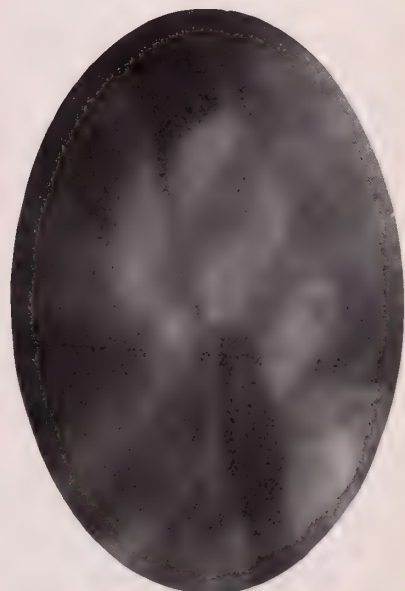


Fig. 10.

Fig. 4.—Variation in outline due to peristalsis.

Fig. 6.—Esophageal peristalsis. The bismuth bolus is being forced downward by peristalsis, leaving the mucous membrane in the upper part painted with the contrast mixture.

Fig. 7.—Esophagus regains its normal tonic (empty) state as bolus is finally expelled, leaving gullet lumen visible as a white streak between two black lines.

Fig. 8.—Esophageal dilatation. Note the coating of the wall in otherwise empty gullet.

Fig. 9.—Stenosis—extrinsic cause—displacement by dilated arch of aorta. Pressure defect of gullet clearly outlined.

Fig. 10.—Stenosis—intrinsic cause—infiltration due to tumor formation, true defect in outline.



Fig. 11.

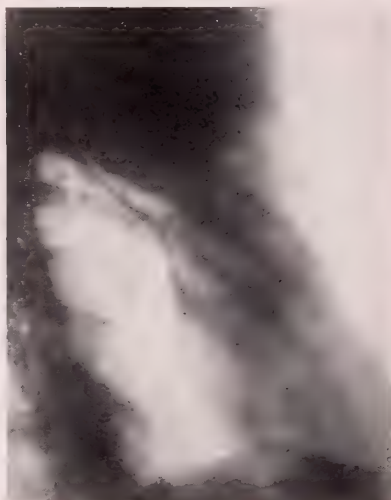


Fig. 12.

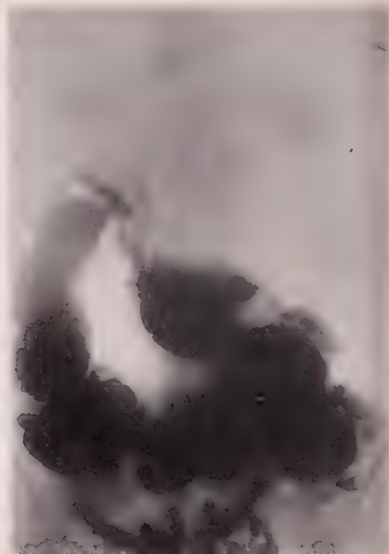


Fig. 13.



Fig. 14.

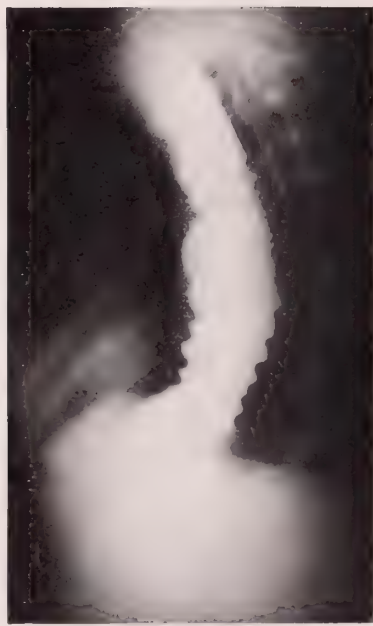


Fig. 15.



Fig. 16.

Fig. 11.—Displacement stenosis, due to dilated aorta.  
 Fig. 12.—Displacement stenosis, aneurysm of arch of aorta.  
 Fig. 13.—Cardiospasm (mild vagotonia). Note smooth outline of lower end, absence of defect.  
 Fig. 14.—Cardiospasm with moderate dilatation. Note sharp outline absence of defect.  
 Fig. 15.—Cardiospasm. To show the exaggerated peristalsis with the dilatation. There is loss of tone but the peristalsis is still vigorous.  
 Fig. 16.—Benign stenosis at single point (cicatrical). Note the symmetrical dilatation and smooth outline. Normal peristalsis below obstruction. Multiple points of stenosis may exist.



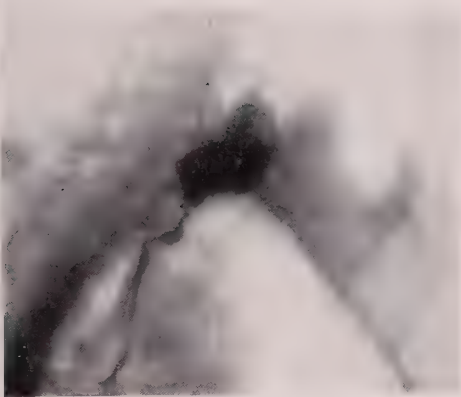


Fig. 17.



Fig. 18.



Fig. 19.

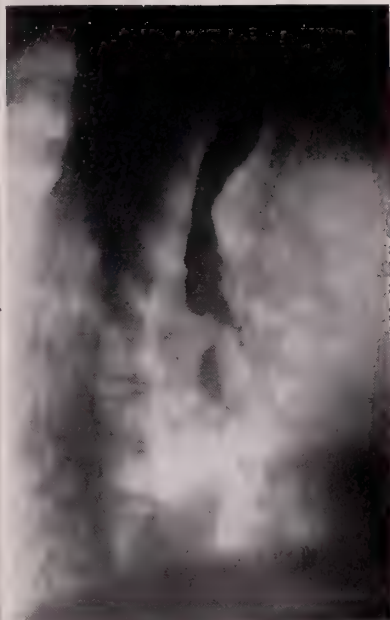


Fig. 20.



Fig. 21.



Fig. 22.

Fig. 17.—Carcinoma—cervical portion.  
 Fig. 18.—Carcinoma, infra-aortic portion.  
 Fig. 19.—Carcinoma, auricular portion. Note serrated defect due to invasion of growth, also shadow of tumor mass in retrocardiac space, immediately about defect.  
 Fig. 20.—Carcinoma auricular portion. Note irregular peristaltic wave of small amplitude. Tumor mass in posterior mediastinum about point of stenosis.  
 Fig. 21.—Carcinoma; epicardial portion with involvement of fundus of stomach, showing serrated defect, in contrast to smooth outline of cardiopasm; no marked obstruction; stomach filled below.  
 Fig. 22.—Carcinoma cardia, showing dilated gullet below empty but painted with contrast mixture,—above partially filled.



Fig. 23.

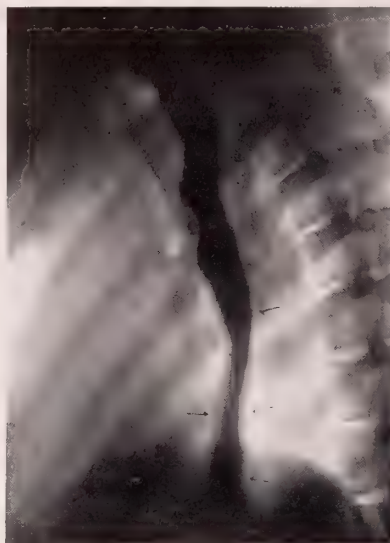


Fig. 24.

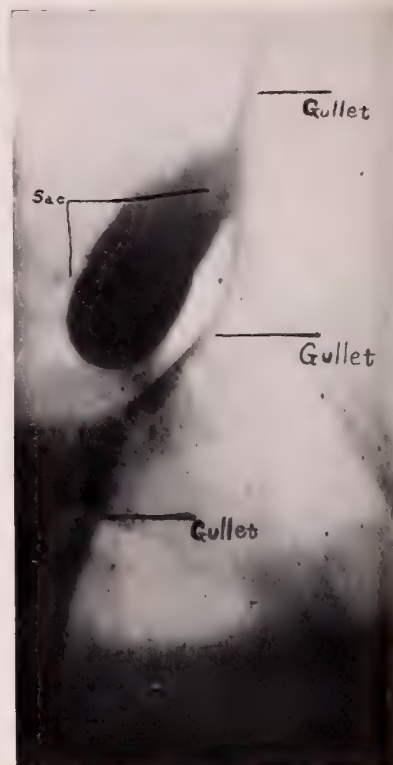


Fig. 26.



Fig. 27.

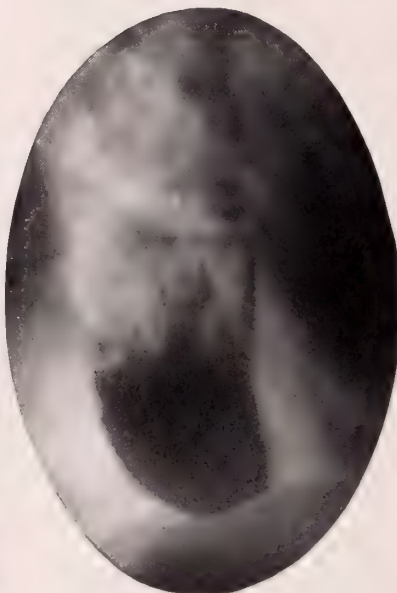


Fig. 28a.

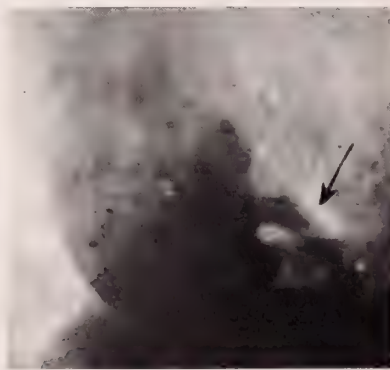


Fig. 28c.

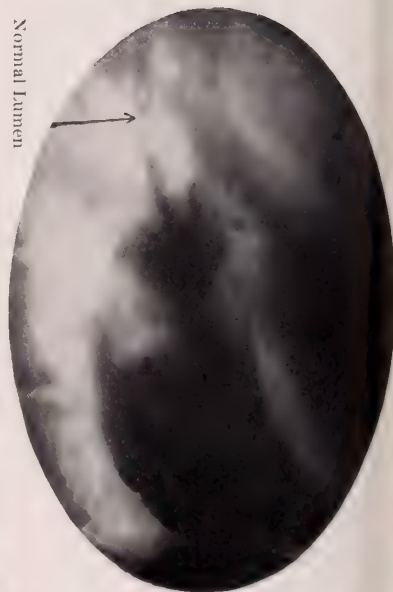


Fig. 28b.

Fig. 23.—Diffuse infiltrating carcinoma lower half, obstruction not marked.  
 Fig. 24.—Infiltration of wall of lower third with partial stenosis at the point of maximum thickening, smooth outline, increased peristalsis. Pre-Wassermann days. History and appearance not suggestive of malignancy. (Syphilis?)  
 Fig. 26.—Pulsion diverticulum, cervical region.  
 Fig. 27.—Diverticulum (traction) in infra-aortic portion.  
 Fig. 28.—Diverticulum, lower end, three views to show necessity of examining in all positions. (a) Suggests cardiospasm. (b) Showing esophageal lumen of normal size above dilated area which is now shown to be circumscribed. (c) Shows emergent narrow stream—normal esophageal lumen.

unless initiated by a swallowing. But in the presence of obstruction the waves of contraction follow each other with great intensity in a manner out of proportion to the voluntary attempt; the contents of the tube are forced downwards, distending the lumen until the limitation of distention is reached, when the regurgitation is observed as a shooting upward of a thin stream of bismuth, while the peristaltic wave continues to travel to the point of obstruction, in an attempt to overcome it. The attempt at compensation failing, dilatation and atony of the esophagus above the point of obstruction takes place. It is not the weight of the fluid alone, but the loss of muscular tone and the stretching of the elastic fibers, which causes the atony and dilatation.

*Peristalsis.*—The peristaltic activity of the esophagus in the propulsion of the bolus into the stomach depends upon the nature and density of the bolus. The muscular contractions of the esophagus are undulating, sinuous or vermicular in character, traveling down the whole length of the tube, the contractions being deeper and resembling spasmodic constrictions at the points of the normal esophageal narrowing. Antiperistaltic movements are not present. The regurgitation which takes place is the reaction of the contractions and not due to reverse peristalsis.

*Tone.*—Normally the esophagus is not in a collapsed state. The walls are not in contact, but the muscular tone is sufficient even in the empty state to maintain a patent lumen of some size through its entire length. This is somewhat irregular in its contour, due to the dorsal and ventral folds of the mucous membrane. Tone and peristalsis are not to be confused. There may be loss of tone with active peristalsis as in so-called cardiospasm, while in Rosenheim's atony there is normal tone with but little peristalsis.

#### PATHOLOGICAL CONDITIONS.

The various pathological conditions affecting the esophagus may result either in stenosis of its lumen or in primary, localized or general dilatations. The causes of the former and more common change may be tabulated as follow:—

##### STENOSIS

##### A. Congenital

##### B. Acquired

##### 1. Extrinsic Causes—Pressure Stenosis

- Aortic, cardiac and pericardial disease
- New growths, neck, mediastinum, lungs
- Glands, goitre
- Spinal disease or injury



## 2. INTRINSIC CAUSES

## (a) Functional: Spasm Stenosis

Primary—with atony and dilatation more or less permanent

Secondary

Mechanical

Inflammatory

Extraesophageal

Intraesophageal

## (b) Organic: Stricture Stenosis

Benign

Ulceration

Caustic

Peptic

Syphilis

Tuberculosis

Tumors

Malignant

Carcinoma

## FOREIGN BODIES.

Foreign bodies are most frequently impacted at the points where the esophagus is normally constricted. This narrowing is present at four points: opposite the cricoid cartilage; above the arch of the aorta; below the arch of the bifurcation of the bronchi, where it is crossed by the left bronchus; and at the diaphragm. Besides these there may be other points of narrowing which are without pathological significance, Mehnert having described thirteen.

Foreign bodies are more frequently impacted in the upper cervical constriction and least frequently in the diaphragmatic. This condition is more common in children than in adults. An innumerable variety of foreign bodies have been impacted in the esophagus. Metallic substances give no difficulty in diagnosis, but soft foreign bodies are more difficult to detect, although many of these may be diagnosed by examination in the oblique position. Occasionally when the foreign body is not visible, its presence may be inferred by a fragmentation, a slight deviation or a momentary hesitation in the flow of the bismuth stream, caused either directly by a foreign body, or indirectly by a spasm at this particular point.

In the examination for the presence of foreign bodies which cast no appreciable shadow, a sharp contraction of long duration at a certain point gives evidence that the foreign body is in this particular position. In the differential diagnosis it should be borne in mind that the epiglottis or calcified areas in the thyroid gland or in the laryngeal cartilages have been mistaken for foreign bodies in the esophagus.

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NOTE.—Whether the patients are to be fluoroscoped or radiographed it is important that they be stripped of every vestige of clothing. The examination should not be made in bed, but upon a table suited for such examinations. These precautions may seem of trivial importance, but they are very essential and many curious errors have arisen from failure to observe them.

It is also important to remember that injuries to the mucous membrane, resulting from the presence of foreign bodies may lead to pathological changes with stenosis which may come on many years after the original injury.

#### LESIONS CAUSING STENOSIS OF THE ESOPHAGEAL LUMEN.

*Displacements.*—Being an elastic muscular organ and lying as it does imbedded in the prevertebral fascia, it is apparent that the position of the esophagus is easily influenced by the movements of the head and trunk and affected by diseased conditions of the adjoining viscera. Because it adopts itself readily to the change of position and deviates with every displacement of the mediastinal contents, subjective manifestation may not appear even when there is very marked displacement, as for instance in effusion or pneumothorax. Though the relative position of the esophagus in the retrocardiac space is by no means constant, still the curves both in the sagittal and frontal planes described are always demonstrable.

The importance of the curves of the esophageal shadow above described lies in their change in position and contour under stress. These may be noted in fluoroscopic examinations and radiographs rapidly made. The esophagus may be made to serve as the indicator for changed static conditions in the thorax, and the study of its position is invaluable in the diagnosis of aneurysm, particularly of the descending arch.

The cervical displacements are best studied in the lateral position and these displacements are most frequently due either to goitre, enlarged glands or to spinal deformity.

The displacements of the dorsal portion are best studied in the sagittal and oblique views. They may arise from lung conditions as tumors, abscess or fibrosis, effusion, pneumothorax or from enlargements of the heart or aorta, and from such diseases of the spine as fracture, spondylitis or tumor. Marked deviation in the form of long, wide curves as from pleural or pulmonary causes may give no sensory symptoms, while the pressure of a very small aneurysm over a very localized area may give the most marked dysphagia.

Considerable pressure without much displacement may be produced by mediastinal lymph-nodes lying near the bronchial bifurcation. Such compression as is caused by a calcareous pleura is usually found in the lower part of the tube. In the cases of Starck and Gottstein, a calcareous plate in the pleura displaced the lower part of the esophagus, excited persistent spasm and later led to perforation. The symptoms in many of these cases are produced more by the associated spasm than by the displacement.

Aneurysms of the arch displace the esophagus backward and to the right against the spine. Aneurysms of the descending arch

almost invariably cause pressure, and the esophageal symptoms may be the first symptoms of the primary condition, the clinical history of which may resemble malignancy of the esophagus.

In aneurysm of the transverse arch, the aortic curve of the gullet is straightened and lengthened, while the supra-aortic curve is markedly accentuated. In aneurysm of the descending arch, this curve is accentuated and approaches nearer the spinal shadow. Enlargements of the heart, particularly dilatations of the auricle, as in mitral diseases and large pericardial effusions, may also cause deviation and compression, as shown by variation of the auricular curve of the gullet. The epicardiac or abdominal portion of the esophagus may be displaced and compressed by a cirrhotically enlarged left lobe of the liver, the venous engorgement of the esophagus undoubtedly contributing to the dysphagia.

By a certain arrangement of the patient, screen and tube, the relation of the affected viscus to the displaced or compressed esophagus may be made out, the distortion of the esophageal outline being determined by tracing the passage of the bismuth bolus of the proper consistency. It will be noted that the esophagus is nearer the spine or overlaps it and that the posterior part of the retrocardiac field cannot be mapped out. The bolus travels slowly and there is a long hesitation at the point of deviation. The break in outline is not a true defect but smooth in contour and crescentic, while the peristaltic wave disappears only to be again active below the deviation.

Adhesions with retraction of the lung may cause displacement, and yet this cause may not be demonstrable because of intervening normal or emphysematous lung. But if the dislocation of any portion of the esophagus is marked, even though the cause cannot be determined, the irregular peristalsis, the movement and course of the bolus will determine the extent to which the function of the gullet is affected.

Simple sclerosis of the arch will cause hesitation in the passage of the bismuth stream, displacement of the tube towards the spine and a small crescentic pressure defect with smooth walls. A sharp displacement may give a shoulder to the bismuth shadow, making it resemble a diverticulum, but this appearance will offer no serious difficulty in the differential diagnosis.

General dilatation of the descending aorta may result in the bismuth stream being broken up into a series of rivulets, which descend slowly, in tortuous lines to the diaphragm. Near the diaphragmatic opening, this deformity in the esophageal outline may be so marked as to separate the bismuth into two distinct streams, with a triangular hiatus between them. This is not to be mistaken for a defect due to a new growth. To sum up: In the upper thoracic part a short, sharp curve in the esophageal shadow suggests the



necessity of examining the aortic region for mediastinal tumors or spinal deformity. Defects situated in the middle portion suggest aneurysm or dilated aorta. Defects situated in the lower portion are due usually to diseases of the heart, dilatation of the auricle or pericardium.

#### SPASM.

In the study of spastic conditions of the gullet two great classes of cases may be differentiated. The secondary spasm—the reflex of irritation, inflammation or ulceration, etc., more or less frequent, affecting any part of the lumen and rarely leading to any permanent dilatation—and the other great class, the primary so-called idiopathic spasm, the etiology of which is not clearly understood but which is associated with marked dilatation of the gullet early in the history of the condition. Though primary idiopathic spasm of the lower end of the gullet with its accompanying dilatation is generally known, it is not so generally appreciated that there is, under certain circumstances, a similar closure of the upper end of the tube, which may result in the dilatation of the hypopharynx and go on to the formation of a pulsion diverticulum. The term idiopathic cardiospasm is thus used to cover the cases of more or less marked closure of the esophagus, associated with dilatation, which may persist for a variable period.

In 1882 Mickulicz described a series of cases of diffuse dilatation of the esophagus (which since Zencker's description in 1878 were held to be idiopathic dilatations), and suggested that the condition was due to spasm at the diaphragmatic end and that the diffuse dilatation was secondary to this closure. To this condition he gave the name of cardiospasm, which has persisted in the literature in spite of the repeatedly voiced objections to it. Robert's suggestion to call the condition esophagismus seems entirely logical.

It has been shown by Schreiber that the part of the esophagus which is affected in the closure is that part from the cardia to about the hiatus esophagi, four to five centimeters long, in other words, the abdominal and diaphragmatic portion. This portion of the esophagus or epicardia, as it has been called, is more or less completely closed while the thoracic part is dilated, though not always atonic. The shape of this dilatation may vary, the largest diameter being either in the upper thoracic or in the lower diaphragmatic portion giving the gullet a spindle, cylindrical or pyriform shape. In some cases the entire length of the tube seems to be increased, occasionally to over fifty centimeters, the gullet taking a winding course, the upper part deviating to the left and the lower to the right with a sacculation of the lower part which may rest on the diaphragm. It is claimed by some, notably Rosenheim, that the atony is primary and the failure of the so-called sphincter a secondary condition, but Plummer holds that both changes occur simultaneously.

Though spasm is commonly accepted as a cause, it is nevertheless rejected by many who believe that the circular musculature of the extreme end of the esophagus is weak, and if anything weaker than elsewhere, and therefore is unable to maintain a continued spasm, and that the diaphragmatic musculature disposed about the esophageal opening plays no part in the esophageal activity. McAllister's "Anatomy" is quoted by Hill to show that "there is no special muscular sphincter in this region and that the whole question of the strength of the muscular fibers is still undecided." According to Hertz it has not been demonstrated by pathological examination of the esophagus in cases of long-standing esophageal spasm that there is any alteration in the muscular fibers. No hypertrophy has ever been shown, and since continued spasm usually produces hypertrophy, it is illogical to conclude that this condition is due to real spasm. Though no actual sphincter exists, there is, however, a marked change in the direction of the folds of the mucous membrane at this point, which may exert a valvular action under the tonic contraction of the circular fibers. The majority of observers consider the condition due to a defect in the nervous mechanism which prevents the relaxation of the opening which is normally closed. The sympathetic system undoubtedly maintains this tonic contraction and the vagus produces the inhibition or relaxation. Stimulation of the peripheral end of the cut vagus results in a closure of the epicardia with dilatation of the gullet. It is apparent, also, from the failure of the treatment of cases of marked dilatation, by divulsion and stretching of the cardia (for in spite of a widened opening, the normal tone nevertheless never returns to the sacculated part), that the simple spasm is not the cause of the condition. Krause has described a case with enormous dilatation of the esophagus in which changes were found in the pneumogastric nerve, less than one-half of the normal number of nerve bundles appearing intact. Willy Meyer has reported cases of intractable inferior cardio-spasm which he cured by vagolysis (the separation of the nervi vagi from the esophagus). The condition has been frequently found in vago-tonic individuals by Eppinger and Hess.

Cardiospasm may occur in the aged, and has undoubtedly been frequently mistaken for a carcinoma of the cardia of the stomach or of the lower end of the esophagus. It may exist in marked form with extensive dilatation with practically no symptoms except occasionally regurgitation.

#### SECONDARY CARDIOSPASM.

A spastic condition of the gullet may be excited both by extrinsic and intrinsic causes, which may be inflammatory, ulcerative or mechanical from intrathoracic displacement or changed intra-abdominal static conditions.

Spasm is responsible for the dysphagia in carcinoma before the actual obstruction resulting from the tumor formation takes place, and it may occur in a part of the gullet distant from the ulceration. It may be so intense as to cause the entry of food into the trachea. Carcinoma may develop in the dilated sac of a cardiospasm. The condition is to be differentiated from spasm complicating carcinoma. In viceroptosis, the ptosed cardiac end of the stomach dragging the epicardia downward may produce a narrowing and spasm. An esophagitis or ulceration of the diaphragmatic end of the tube may be responsible for the closure, and such ulcers may go on to perforation, as in the cases reported by Sencert, in which there was a perforating ulcer, two centimeters above the cardiac end of the esophagus. The symptoms in the peptic ulcerations are due entirely to the associated spasm. Ulcerations in the cardia of the stomach may cause esophageal spasm. High spasmodic hour-glass contractions of the stomach, with and without ulceration, may accompany esophageal spasm. In the latter case it is probably associated with primary cardiospasm as a manifestation of vagotony.

Early diagnosis is important because where sacculation has existed for some time, an anatomic cure is improbable.

Sounding has little value as a diagnostic measure, because, in spite of the closure, the tube will, in the early stages, before dilatation has occurred, frequently pass with little or no hindrance into the stomach, but when the dilatation has occurred, the end of the sound may push against a portion of the dilated tube and thus the error may be made of suspecting the presence of an actual stenosis, the nature of which, of course, cannot be stated.

A fluoroscopic examination in the case of a temporary spasm will show that there is a halt for a considerable time at the point of junction of the esophageal shadow with the diaphragm. Strenuous swallowing efforts may prove of no avail, and yet after a time without apparent reason the bismuth may be seen to trickle in a fine stream through a narrow opening in the stomach. The fine stream has its origin in the center of the cone-shaped dilatation and persists until the bismuth has actually left the partially closed portion of the esophagus.

In the primary cases with dilatation, the bismuth drops swiftly without peristalsis to the surface of the fluid usually present in these dilated sacs, spreads itself for a moment over the surface of the fluid and then sediments rapidly in irregular lines to the base of the sac. Undulations over the surface of the fluid transmitted to it by the aortic pulsation are visible even without bismuth and succussion waves may be easily demonstrated. Below, the conical bismuth shadow on the diaphragm throbs violently, though slowly, for the heart action in the majority of the cases of primary spasm is slow.



Swallowing efforts result only in rapid deep waves of small amplitude moving to the base of the shadow with occasionally a resulting regurgitation. The closure in these cases is as a rule permanent. About the point of obstruction, however, the outline is smooth. The peristaltic wave is visible to the very lowest portion of the sac. The sac may assume various shapes, spindle or sigmoid, depending on the loss of tone and dilatation which may extend as high as the cervical part. The edges of the dilated sac are well defined, while the dilatation above the point of stenosis is usually symmetrical. There may be an apparent lengthening of the gullet with a blind pouch which rests on the diaphragm.

#### STRICTURE.

The most common affection of the esophagus is a stricture of its lumen. This stricture may be benign, resulting from the cicatrization of ulceration due either to intrinsic or extrinsic causes, as disintegration of a gummatous infiltration, the ulceration resulting from the perforation of a tuberculosis gland, from induration due to inflammation, or from malignant or benign growths having their origin within or without the esophagus.

*Benign Stenosis.*—Benign or scar stenosis is as a rule asymmetrically situated while the extent of the stenotic area is short. Stenoses due to corrosives are most frequently found either at the pharyngeal mouth or in the upper dorsal part of the tube.

The radiographic examination of benign stricture will show that the peristaltic wave extends to the very lowest portion of the dilated sac and is visible in the thin stream flowing away below the point of stenosis. No defect in the esophageal outline exists. The dilatation above the point of stenosis is perfectly symmetrical, smooth and cup-shaped, with the emergent stream having its origin almost in the center of the cup-shaped dilatation. The outline of the entire tube even at the point of stenosis is even and smooth. The retrocardiac space is free from tumor shadows. In some cases the stricture may be multiple, but the stream resumes its flow in the center of the dilatation, the peristalsis is present in the tube beyond the stenosis, and the normal hesitation at the cardia takes place.

#### CARCINOMA.

The commonest form of stenosis of the esophagus is that due to carcinoma. At least 70 per cent. of patients complaining of dysphagia have this disease of the gullet. The importance of early diagnosis of this condition need not be dwelt upon, and the hope of surgical intervention raised of late by surgeons makes it imperative that this disease be diagnosed while the lesion is still localized and small. This task, however, is not an easy one. Though apparently the prominence of the symptoms would tend to indicate that this

condition would be diagnosed sooner or later before the patient's death, yet Cabot states in his paper on "Diagnostic Pitfalls in Medicine" that carcinoma of the esophagus gives an unusually large percentage of error (of 26 cases, 7 were not recognized with certainty during life), and he believes that the percentage of undiagnosed cases would have been larger but for the routine bronchoscopic examinations. The esophagus is an organ relatively silent in its subjective manifestations and severe lesions may exist with relatively little discomfort. At the diaphragmatic end the disease manifests itself earlier because spasm is more frequently associated with the growth in this locality. In 4 of the cases cited by him there was no dysphagia, though hoarseness and aphonia were present. Unilateral paralysis of the vocal cords is not a rare accompaniment of malignant gullet disease. According to statistics gathered by Janeway and Green the most frequent site of carcinoma is at the cardia (52 per cent.), the next at the bifurcation (32 per cent.), while 15 per cent. are found in the upper part of the esophagus. Though found in any portion of the tube there is an apparent predilection for invasion at the points of the physiological narrowing, where the epithelial lining undergoes modification.

Growths in the aortic part also give very early symptoms because the lumen is here small. Spasm accounts for the variability of the early symptoms of carcinoma and the apparent temporary improvement. A persistent spasm of the esophagus at the sites of predilection, therefore, in patients of the carcinoma age, should be considered with suspicion even though no actual obstruction exists. There is a peculiar disturbance of innervation of the gullet with marked disturbance in the coordinated activity of the swallowing act in the carcinomatous lesions in any part of the tube. This frequently results in the entry of the mixture into the trachea.

The tumor may assume various shapes; it may spread as a flat growth, it may exist as a papilloma, or it may be an ulceration of the epitheliomatous type; occasionally it takes the form of a solid mass which embraces the entire circumference of the tube. Polypoid forms have also been described. As a rule these tumors involve but a part of the surface of the tube; rarely do they involve its entire internal circumference. This accounts for the variability and irregularity in shadow appearance of the form of the defect. The growth may exist as a simple thickening of the wall with no change in the mucosa, the so-called submucous type, which may simulate a spastic condition and present no defect in outline, but the absence of peristalsis, the narrowing of the lumen and the infiltrated wall may be demonstrated.

The lesion may be multiple and may be associated with another variety of esophageal lesions, for instance a carcinoma, or may develop within a diverticulum as in cases reported by Pitt, Huettner

and Fisher. Yet no matter how small these tumors, in every instance the lumen of the tube is encroached upon, though the narrowing may be so slight as not to offer any marked hindrance to the passage of food and none to the passage of sounds. The symptoms will depend not upon the size of the tumor or the extent of involvement, but upon the degree of stenosis and the severity of associated spasm. The dilatation of the gullet above the point of carcinomatous stricture is never marked. In fact, if a marked and extensive dilatation is present, it is suggestive of other conditions.

Attempts to diagnose these cases of beginning obstruction by the usual bismuth method have failed because of the distortion of the tube by the distention, resulting from the attempt to outline its lumen with large amounts of heavy bismuth mixtures. The finer differences in the calibre of the lumen are obliterated and the presence of small tumors obscured. By the technique described, however, and with a small amount of bismuth mixture, a half of a teaspoonful properly prepared, the slightest degree of stenosis may be determined, the outline of the tumor delineated, actual change in lumen determined, and what is extremely important, peristalsis studied (for its absence, over an area with or without defect, which excites suspicion). The radiographic signs of a neoplasm of the esophagus are defect in outline, absence of peristalsis over area of defect and distal to the stenosis, persistent obstruction and the secondary signs of the latter. When occurring in the diaphragmatic portion of the esophagus or the epicardia as it is called, it is usually secondary to carcinoma of the cardiac end of the stomach, and then the signs of defect, distortion of air bubble, retraction of lesser curvature are present. Carcinoma of the liver may cause stenosis and displacement.

In marked hypertonicity or in high hour-glass contractions, considerable back pressure into the gullet may take place with dilatation of the lower third of the tube, and this is not to be confused with new growth at the cardiac end or cardiospasm. The differentiation of carcinoma from cardiospasm must be made. It will be found by close examination that the outline of the esophagus in cardiospasm is smooth and the lumen is obstructed at a single point. There is no defect. The peristalsis is actively present and the dilatation above the stenosis is usually extensive. The gullet contains fluid over which the bismuth bolus spreads as described. In carcinoma, however, the outline of the lowest part of the dilated esophagus is extremely irregular, serrated, constituting the defects in the esophagus shadow, corresponding to the invasion of the growth, and, further, the point of obstruction is really above the diaphragm. There is no hesitation at the diaphragmatic end. The stream as it passes the obstruction flows swiftly without peristalsis into the stomach. The epicardia is apparently paralyzed.



Irregular, temporary, spastic contractions may, however, be associated with carcinoma of the cardia and may cause symptoms of obstruction long before the neoplasm has attained any size. Such extensive and rapidly progressive dilatation of the tube as occurs with cardiospasm is never found with carcinoma. There is no fluid retention in the dilated tube above the tumor.

One of the late results of carcinomatous involvement of the esophagus is the perforation of the growth into the adjoining organs, commonly into the lung. In one case, examination after a palliative gastrostomy has been performed, made in order to determine the condition of the tumor, the bismuth was seen to enter the bronchi near the point of stricture and to diffuse itself rapidly throughout the left lung. The contrast mixture was gradually coughed up without any difficulty. Similar cases have been reported by Schwarz and Zimmern. In a case reported by Libman there was a perforation of an epithelomatous tumor with the formation of an abscess in the mediastinum. Gummatous perforation may also occur. The radiological differentiation is impossible.

That benign tumors occur within the esophagus is well known. They may be in the form of sessile or pedunculated single or multiple fibro-myomata or lipomata. Radiographically they cannot be differentiated from malignant tumors.

#### STENOSIS OF THE ESOPHAGUS DUE TO SYPHILIS OF THE STOMACH.

The role of syphilis in diseases of the esophagus has not yet been fully described from a roentgenological standpoint.

Tertiary syphilis of the esophagus may show itself in two forms. There may be a gummatous condition of the submucosa which may degenerate with consequent ulceration, cicatrization and stenosis. These lesions are frequently multiple, occurring in different portions of the esophagus. Radiographically the picture resembles that due to cancer, excepting in regard to the multiplicity of the lesion. The disease may also be present as a diffuse process encircling the entire lumen of the tube over a distance of several inches, occasionally for the greater part of its length. This is seen as a thickening of the wall of the esophagus due to submucous infiltration and sclerosis with points of partial stenosis, the area of infiltration merging gradually into the normal tissue. The lower third of the tube is most frequently involved. The diagnosis in these cases is not difficult, for there is no other lesion which shows this peculiar submucous thickening of the wall so extensive and without ulceration. In a doubtful case the successful test of treatment, in spite of negative blood reaction, would indicate the syphilitic nature of the lesion. It is, however, to be borne in mind that the relation of cancer to gumma of the esophagus is probably the same as gumma to cancer of the tongue.

There is also a variety of diffuse dilatation of the gullet which is due to syphilitic sclerosis of the stomach. The dilatation takes place in a similar way, as it results from carcinoma of the cardia or from diffuse scirrhus growth. Because of the greater chronicity of the syphilitic process the dilatation is far more extensive. The esophageal picture resembles cardiospasm. The gullet is filled with fluid. There is no defect in outline. The peristalsis is diminished or absent. The stomach is very markedly diminished in size.

#### CONGENITAL MALFORMATIONS.

Congenital malformations of the esophagus are relatively rare and are usually associated with other defects. There are several forms:—

1. Total absence.
2. Partial or complete doubling.
3. Tracheo-esophageal fistula.
4. Stenosis due either to membranous fold or narrowing of the entire lumen.
5. Congenital dilatation of the diaphragmatic portion only, or of the entire gullet.
6. Partial obliteration.
7. Complete obliteration of the lower part with tracheobronchial fistula.

#### CONDITIONS CAUSING PRIMARY DILATATION OF THE ESOPHAGUS LUMEN.

These dilatations may be circumscribed or diffuse. The former or diverticula are pockets in the esophagus which may occur along any portion of the tube or lower pharynx. The latter may involve the entire length of the tube. A diffuse dilatation may have its origin in a congenital malformation. A congenital dilatation of the lower portion of the gullet has been described by Arnold and Luschka, the latter naming it the *Vormagen*.

#### DIVERTICULUM.

There are two varieties, the pressure or pulsion and the traction. The pressure or pulsion diverticula are usually found in the upper posterior portion of the esophagus near its mouth, that is to say, near its junction with the pharynx. The actual existence of this mouth of the esophagus has been demonstrated by Killian and by Goldman. The latter, on exposing the esophagus during the thyroid operation, demonstrated a ring of constriction at the junction of the esophagus and the pharynx, which disappeared on swallowing, as the air column of the pharynx above and the air column of the esophagus below came into contact. At the beginning of the act

of swallowing the ring is closed, but opens as the larynx moves upward.

As a result of the failure of relaxation of this pharyngeal sphincter, dilatation to a greater or less extent of the hypopharynx takes place. This is predisposed to by a lack of support in the wall posteriorly, which from continued pressure gives way at a certain point and thus a diverticulum may be formed. Besides this type which is always situated at the junction of the pharynx and esophagus, lateral or posterior, there is a type which may occur in any part of the upper end of the tube. They are usually small, but pouches the size of a child's head have been described. These formations are predisposed to by a deficiency in the wall, resulting from the imperfect closure of a bronchial cleft, and this has been actually demonstrated by Pollard. These are usually found on the anterior or lateral part of the tube, but most frequently on the left side.

The second form or traction diverticula are usually situated in the lower portion, to the left and posteriorly. These traction pouches are due to cicatricial retraction arising from adhesions due to fibrosis, of disease of the bronchial glands and mediastinitis. They are usually found below the level of the bifurcation, but may occur as low as the diaphragm. Such large diverticula in the lower part have been described by Kelling, Jung and Reitzenstein.

To what extent the vacuoles, described by Schultz, Kreuter, Schridl, Johnson, Lewis and others, which occur in the esophagus, are responsible for the production of diverticula, is a question which remains for solution. It is highly suggestive that these vacuoles are found most commonly in the lower lateral portions of the tube, the most frequent site for so-called traction diverticula. These vacuoles may open directly into the lumen or may be separated from it by a layer of epithelium. They may coalesce with the formation of small cavities. It is conceivable that these small cavities may be the starting point for the formation of these lesions, which may be influenced not only by the gradual distention but by pulsion from extrinsic adhesions. In the lower third of the gullet the pathological lesion is undoubtedly aided in its genesis by the pulsation transmitted to this part by the heart.

The diagnosis is extremely difficult by clinical methods, though the value of the Plummer string test in large sacculations in the lower part of the tube is undeniable. The early diagnosis, however, is important because the condition may exist without symptoms, and even when symptoms are present they are such as are common in any form of esophageal stenosis. However, the prominence of cough and dyspnea (due to irritation and pressure of the tumor) are suggestive symptoms. When the base of the sac is not much below the level of the opening, the condition gives but few symptoms.

The sound is not of much assistance in the diagnosis of these



conditions, because by means of this instrument no differentiation can be made from a stricture due to carcinoma, on account of the entry of the proximal end of the tube into the lowest portion of the sac. Frequently when the opening of the diverticulum is in the upper and anterior portion of the esophagus, the sound may pass this opening without giving any clue as to its presence, particularly if the pouch is small. Nor is any information given as to the location or size of the sac, nor can deep diverticula of the lower part be differentiated from spasm with diffuse dilatation and blind pouch formation.

The roentgen examination will indicate not only the location and shape but the actual size of the sac, and for the examination of no condition is the fluoroscopy of the chest in all directions as important as here. It will show that there exists alongside the shadow of the esophagus a space which may be filled with the bismuth mixture, and that this shadow is distinct in part from the main shadow of the gullet and moves forward or laterally during swallowing. This shadow may be oval or spindle-shaped, with its lower border convex and smooth and its upper horizontal and surmounted by a brightly illuminated area due to an air bubble. Just below the air bubble a narrow stream of bismuth leads to the main stream of the esophagus outlining. Frequently where large diverticula are present, the entry of the bismuth mixture into the sac does not always take place because of the pressure of the fluid-filled sac which narrows and distorts the opening and causes dilatation of the tube above this point. The position of the larynx and trachea is deserving of study in the search for pulsion diverticula in the neck. It is also important to study the pouch from all sides in order to determine the point of its origin. The compression of an extraesophageal tumor gives an appearance of the bismuth column which suggests a diverticulum, but the emergent stream is from the very lowest part of the tube and not from the side as in a diverticulum.

There is a class of cases, which is not to be confused with diverticula, in which, though no actual sacculation exists, there is, nevertheless, because of some disturbance in the muscular coordination of the swallowing act, an accumulation of bismuth in the hypopharynx, which is emptied slowly after several swallowing movements. This is undoubtedly due to failure of the normal opening of the pharyngeal sphincter and belongs to the category of spasm. So, also, the pouch formation which is found in long standing cases of closure of the lower end of the esophagus (esophagismus) are not to be confused with diverticula. Careful examination in all directions will serve to differentiate these conditions by demonstrating the normal esophageal lumen above and below the sac.

Holzkecht has called attention to the differential diagnosis between small diverticula and the dilatation secondary to stenosis. It

is in these small diverticula that diagnosis is particularly difficult. In this condition the bismuth flows on beneath the cup-shaped dilatation, almost in the same way as it is seen flowing into the cup above. In the stenosis, on the other hand, the flow into the cone-shaped base is in a broad stream, while the outflow is in a thin, dribbling line. In large diverticula this differentiation is not always possible, because the distended pouch, exerting its pressure upon the tube itself, so narrows its lumen that the stream of bismuth below the point is very similar to that below the organic stricture. In this case, however, it is important to observe that peristalsis persists in the emergent shadow and the outflow of the bismuth is not from the lowest point of the convexity of the cup, as it is in stenosis, but rather from the side, the point of exit being above the lowest point of the convexity of the cup, and by perseverance and persistency in the examination, the actual opening of the diverticulum will usually be seen and the two shadows differentiated.

#### ATONY OF ESOPHAGUS.

Rosenheim has attempted to establish an entity of atony and to explain the disturbances in the act of swallowing in certain individuals and which are quite characteristic and are to be differentiated from those due to an organic condition on the basis of an atonic paretic condition of the musculature. These disturbances in swallowing are usually present in neurotics who complain of difficulty in swallowing and such subjective symptoms as pain in the neck and chest, choking and stifling sensations. These symptoms are frequently associated with inanition and occasionally regurgitation, and thus closely simulate those of a malignant process. The condition has been explained as being due to a nerve degeneration.

The swallowing time is prolonged. The food bolus passes down very slowly, hesitates for a long time at the points of physiological narrowing, or remains in the entire length of the lumen and sometimes regurgitates, apparently as a result of tonic contraction of the gullet and a general narrowing of the lumen. The peristaltic waves cannot be seen in many cases, the entire tube being completely filled with the bolus which slowly glides into the stomach.

In the bismuth roentgen-ray examination, as I have outlined, we thus have a method that is simple, safe and feasible in all cases, enabling us to discard such older methods as direct palpation, through a gastrostomy or esophagotomy wound, as proposed by Gangolphe, or indirect palpation by the aid of sound or bougies. These and the physical means of auscultation for stenotic or pressure murmurs, the variation of the normal sound, obliteration or modification of the second swallowing sound, or such evidence as Revidzoff's residual sound, are no longer in use. By the roentgen

method the direct visualization makes manifest and apparent what, by other methods, are only guessed at or surmised. It is not to be questioned that through the agency of the intrascopic associated with the roentgen examination considerable aid can be given the clinician in the diagnosis of esophageal lesions.

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## OBSERVATIONS ON DUODENAL ULCER WITH SPECIAL REFERENCE TO ITS X-RAY DIAGNOSIS.

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The *x-ray* has become a potent factor in the diagnosis of gastrointestinal diseases. Unless all indications fail, it is destined to occupy a still more important position. The accomplishments of this method cannot but be of interest to the readers, as to the future relation that clinical gastro-enterology and gastrointestinal radiology will bear. Clinical findings and *x-ray* findings are parts of the general examination, and depreciated if separated. There should be no *x-ray* diagnosis as such; to-day no examination is complete without it. Workers approaching the problem from different positions frequently lose sight of the fact that a correct diagnosis is the objective and not the elicitation of evidence by one or another method. There should be available when *x-ray* examination is begun, a complete clinical history with report of physical and laboratory findings. Information derived by the *x-ray* should not hold any more individual a position than do results obtained by microscope, stomach tube or palpation; each is thus placed in its most valuable position as a contributor to the diagnosis.

The object of this paper is to review certain *x-ray* findings in duodenal ulcer as far as possible in their relation to clinical teaching and experience. Observations are founded on a series of 60 operatively confirmed cases of duodenal ulcer and over 100 cases so diagnosed and treated medically in which both clinical and *x-ray* findings were characteristic of duodenal ulcer, including many with history of hemorrhage. While I believe the position in part an unjust one, it is wiser as will be done, to draw conclusions only from operatively confirmed cases.

The *x-ray* has revealed certain anatomical and physiological phenomena bearing on the diagnosis and possibly etiology of duodenal ulcer. A great field is to be developed by the *x-ray* through better understanding of the alimentary anatomy and physiology, consequently of variations of such. The first requisite to a utilization of variations from normal conditions is a knowledge of variations that are normal. We note great variation in tonus, motility, and more obviously, in anatomical structure and arrangement. One individual's stomach is all but thoracic; another's largely reposes in the pelvis. The bodily configuration of the one is totally different from that of the other. Both may be in perfect health, for the widest

variation in form, position, tonus and motility of the viscera are compatible with adequate function. Who would not grant that faces, hands and bodies are infinitely variable, that each member or part is typical of its possessor, and that all parts bear to each other, and consequently the whole, a certain individualistic symmetry. Is it not possible that the viscera conform to this individualistic symmetry in the same way, no matter how different from our hitherto recognized standards conceived in darkness?

In an uncompleted *x*-ray study which has now reached some 800 cases, I have attempted to ascertain the constancy of visceral form, position, tonus, and motility as a possible corollary of the general physique or type. The figure drawings illustrating these types are orthodiagraphic records from this collection.\* I shall draw on this study for certain conclusions that seem to have a bearing on the diagnosis and possibly etiology of duodenal ulcer.

The form, position and motility of the stomach with relation to the physique or habitus of its owner, is in two extremes an absolute constant and may be anticipated from a consideration of the physique. If they do not correspond, conditions are abnormal. First, in hypersthenic individuals (Fig. 1), a hypertonic stomach is always present. Such stomachs are two hours faster in motility on a usual bismuth, fermillac meal than those of the asthenic type occurring in persons of slender habit. This emptying time of the stomach in hypersthenics is from one and a half to three and a half hours, dependent on the degree to which the physical characteristics of the hypersthenic type predominate. The second type is Stiller's well-known "*asthenia universalis congenita*." The stomachs of such subjects in disease or health are invariably low in position, poor as to tonus including that of the pylorus, and slower in motility (Fig. 2). Their emptying time is from five to six and a half hours on the same bismuth meal used in determining total gastric motility for all types. A six-hour residue in persons of this type is not infrequent and represents normal conditions. To reiterate: in the asthenic we are dealing with a distinct type in whom a pelvic digestive plant of slower motility is a normal condition. The time of gastric emptying in intermediate types is dependent on the degree to which sthenic or asthenic physical characteristics predomi-

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\*These graphic studies are made by assembling the orthodiagraphic tracings of the chest, two stomach tracings (after the ingestion of bismuth and water, and bismuth and fermillac), and of the position of the contrast media in the intestines at the time the stomach was ascertained to be empty. These tracings are assembled in such manner that they occupy their relative positions in the body and then reduced to one-fourth their original size with a pantagraph. The resulting reduced orthodiagraphic tracings are then fitted into a body outline traced from a photograph, the subject under examination being posed in exactly the same position as when the tracings were made and at such a distance from the camera that a figure reduction of exactly one-fourth the size of the subject was obtained, of course, to scale. The result is quite accurate.



nate. All intermediate types and corresponding rates of motility occur (Figs. 3 and 4).\* As an aside, it may be mentioned that rate of both small and large intestinal motility bears the same rela-

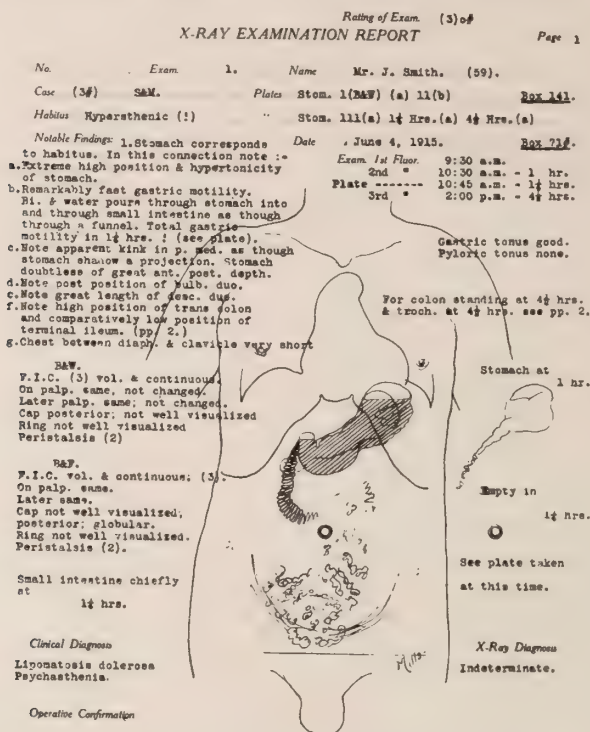
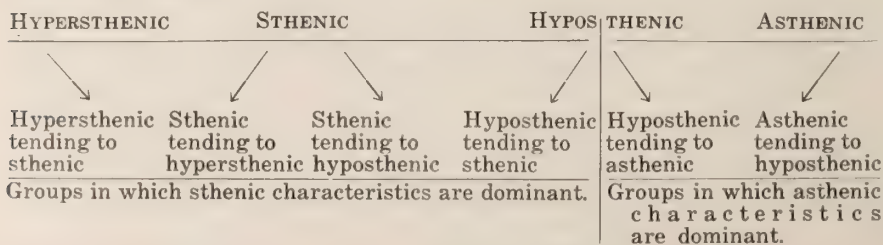


Fig. 1.—Graphic record of an individual classified as hypersthenic, showing very high position of normally hypertonic stomach; apparently small because anteroposteriorly deep. The unusually fast gastric motility characteristic of such subjects is indicated, the stomach being here empty in 1 1/4 hours (standard bismuth meal). Extreme hypertonicity and initial hypermotility cannot logically be considered as indicating duodenal ulcer in such an individual, as they are normal in persons of this habitus. Characteristic of the hypersthenic habitus are extremely powerful physique, deep massive thorax, wide intercostal arch and ensiform, transverse heart and diaphragm, and a considerable amount of body fat. Duodenal ulcer is common in this type.

\*In a tentative classification that has developed from this study, subjects have been divided into hypersthenics (Fig. 1), sthenics (Fig. 3), hyposthenics (Fig. 4), and asthenics (Fig. 2) with six intermediate types. For instance, the habitus of a given individual may in the main be sthenic but tending to the hyposthenic, or asthenic tending to the hyposthenic. The following diagram may illustrate:—



tion to habitus as does that of the stomach, being much more rapid in the full sthenic.

If this concept be entertained, certain features with regard to duodenal ulcer may be noted. The stomach in uncomplicated duodenal ulcer is generally considered to be characteristically hypertonic (Fig. 5). Hypertonic stomachs are characteristic of those

Rating of Exam. (S) o#

X-RAY EXAMINATION REPORT

Page 1

No.	Exam.	1.	Name	Miss Faith Ankeny. (221)
Case (3)	S&M.	Plates	3 G.B. (a) Stom. 1(a) 11(a)	
Habitus	Asthenic			Box 207.

Notable Findings: Date Nov. 23, 1915.

1. Stomach corresponds to habitus, extraordinarily low position of stomach, Exam 1st Floor 9:30 a.m. 6 1/2 Hrs.  
 2nd " 3:45 p.m.  
 extreme gastric atony. Cap higher when stomach filled (S&M) than when partly filled (S&M); doubtless due to elevation following decrease in pelvic space; i. e., occupation by filled stomach. Stomach apparently very "large": i. e., shallow in ant. post. diameter. Note very low position of gastric residue at 6 1/2 Hrs. (Gastric tonus very poor. Pyloric tonus poor.)

2. Possible gastric motor insufficiency; residue (small amt. (2)) at 6 hrs. Doubtful whether this can be considered much of a delay (habitus).

3. Absolutely no pyloric resistance to initial canalization on palpation; at 6 1/2 hrs. difficult! (MCL reflex?) (Hyperacidity.)

4. Some question as to whether filling defect present in p. card. Probably but normal ramification of rugae from about esophageal orifice.

S&M.  
 No I.C. vol.  
 On palp. I.C. (1) S&D; passive with greatest ease  
 Later palp. I.C. (3); passive; C&D; easy.  
 Cap large (1); perfect.  
 Ring perfect.  
 Peristalsis (1).  
 S&M.  
 I.C. vol. (1); cap only. peristalsis; half filled.  
 On palp. I.C. (2) S&D; easy.  
 Later palp. same.  
 Cap perfect.  
 Ring perfect.  
 Peristalsis (1).

Stomach small amt. (2), small intestine, & cecum (very slight) at 6 1/2 hrs.

Clinical Diagnosis  
 Chol. lithiasis. Cystic duct stone?  
 (Possibility Dietl's crisis. Nephroptosis.)  
 Gastric stony. L.

Operative Confirmation

X-Ray Diagnosis  
 Asthenic conditions.  
 Extreme gastric atony.  
 Gastric motor insufficiency (functional).  
 G.B. plates negative.

Fig. 2.—Graphic record of individual classified as asthenic. Characteristics of this type are narrow thorax, capacious pelvis (relatively), narrow intercostal angle, sloping diaphragm, drop heart, and markedly atonic stomach of extreme low position. The stomach in this type is slow as to total motility; in this instance not empty at 6 1/4 hours and without indications of stenosis, i. e., pylorus easily and freely canalized on palpation. Uncomplicated duodenal ulcer is rare in this type (of interest because this is the type in which so-called gastropnoxis with duodenal kinking considered by some as the cause for duodenal ulcer occurs). Curiously this is the type that seems most frequently to develop pyloric stenosis from duodenal ulcer.

of sthenic habitus; consequently the stomach in duodenal ulcer becomes either abnormally tonic, or duodenal ulcer occurs in those who have normally hypertonic stomachs. An investigation will suggest that both are true. First, that duodenal ulcer occurs most frequently in those of sthenic or hypersthenic habitus, both male and female, that it occurs in the hyposthenic less frequently and still more so in the pure asthenic. Such a conception suggests a

possible anatomical factor in the causation of duodenal ulcer, possibly the faster motility of the hypertonic stomach of sthenics as a result of which the duodenum must tolerate an influx of acid gastric juice more frequently and steadily. The relatively lower position of the cap in sthenics may also be a cause in maintaining its acid content more constantly (Fig. 1). On the other hand, in order to form a true appreciation as to whether a stomach is hypertonic in a given case, the general habitus, the great factor in determining

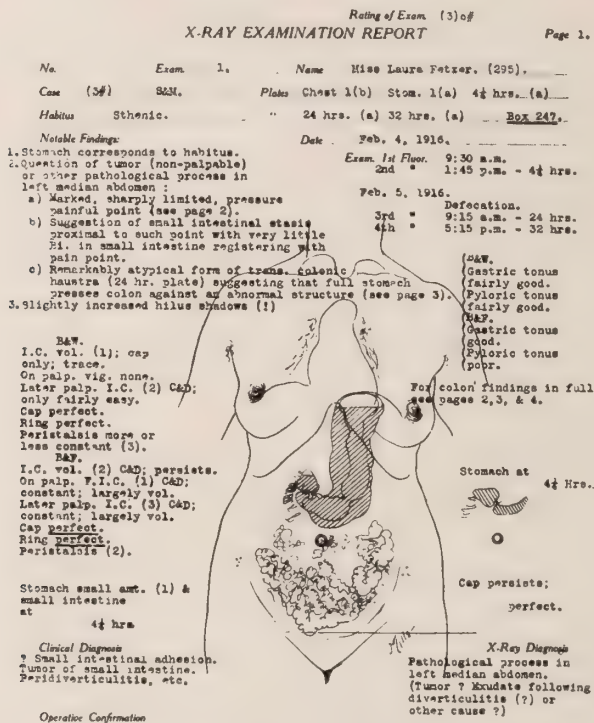


Fig. 3.—Graphic record of individual classified as sthenic. The stomach is here high in position, of good tonus and of faster total motility than the average. Attention is attracted to other characteristics of the sthenic; level diaphragm, wide intercostal arch, relative narrow hips, etc. Duodenal ulcer is more common in this type than any other.

the degree of visceral tonus, must be taken into consideration. The stomach associated with duodenal ulcer may be largely below the umbilicus, yet its degree of tonus be greater than is normal for that type of individual in whom it occurs. I believe that considered in this light, gastric hypertonus will be found to be an even more constant accompaniment of duodenal ulcer. Even more interesting is that apparently stenosis from duodenal ulcer contracture occurs more frequently in those persons whose physique tends to the asthenic. Possibly the more rapid egress of food from the stomach



in sthenics tends to prevent stenosis both directly, *i. e.*, mechanically and through resulting greater activity of the pyloric sphincter, *i. e.*, physiological contraction and relaxation.

Should certain complicating factors exist, gastric hypertonus characteristic of duodenal ulcer is lost to a degree commensurate with that of the complicating factor. Such factors are duodenal stenosis resulting from ulcer, and general conditions causing atony, such as general debility from hemorrhage, and the like (Fig. 6).

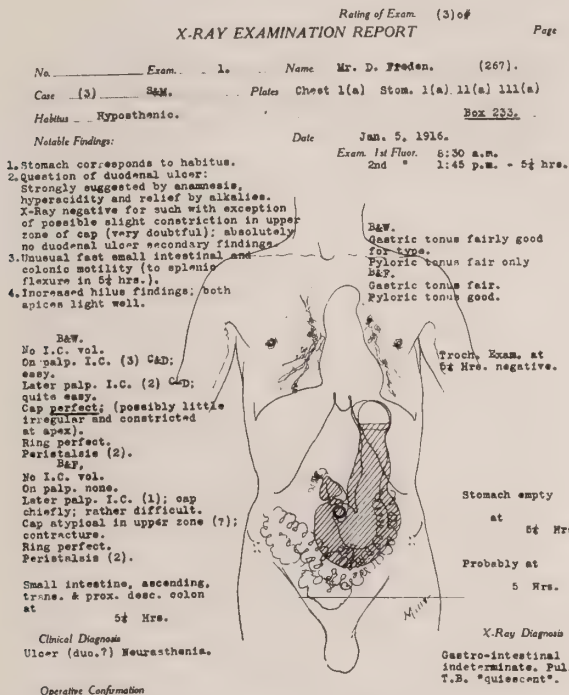


Fig. 4.—Graphic record of individual classified as hyposthenic. In such subject the stomach is moderately low in position, of fair tonus and of average motility as regards complete emptying time (here 5½ hours). Characteristic of this habitus are moderately slender build, somewhat narrow intercostal angle with small ensiform and rather large pelvis. Gastric hypertonicity is not normal in this type, and if present might be considered suggestive of duodenal ulcer. Duodenal ulcer is fairly frequent in this type though less so than in those of sthenic habitus.

There is undoubtedly an initial tonic closure of the pylorus independent of the hydrochloric acid reflex. In uncomplicated duodenal ulcer this initial tonic closure of the pyloric sphincter, for some reason, is usually lost resulting in the well-known increased initial motility of duodenal ulcer. It is possible that there is a second sphincter at the termination of the first portion of the duodenum, at the apex of and a contributory factor in the formation of the



hypertrophy has occurred. This especially in much dieted cases (Fig. 8). On the other hand, beginning stenosis without clinical symptoms of such—what I am accustomed to speak of as sub-clinical stenosis—may through resulting atony, distinctly modify the stomach form, rendering it atypical as to hypertonicity for duodenal ulcer (Fig. 9). That percentage of duodenal ulcer cases not associated with gastric hypertonus represents cases of frank steno-

Rating of Exam. (3) of 8

X-RAY EXAMINATION REPORT

Page 1

No. Exam. 1. Name. Mrs. John Pazdera. (213)

Case (34) S.M. Plates Chest 1(a) 11(a) Box 86, Stom. 1(a)

Habitus Sthenic. " 11 (b) 6 1/2 Hrs. 1(a) Box 203.

Notable Findings: Date Nov. 18, 1915.

1. Stomach does not correspond to habitus, lower and more atonic than would anticipate, and of globular form and central position of gastrectasis.

2. Gross gastric motor insufficiency. Practically entire mass of St. retained in stomach at 6 1/2 hrs., as judged by almost negligible amount in intestines at this time.

3. Remarkable mutilation of left lung; much contracted and covered by markedly thickened pleura as judged by general dim tone over tissue; left apex does not light or cough; emphysema of right lung; diaphragmatic excursion limited (probably compensatory).

4. Dislocation of entire heart and aorta to left of spine; probably as result of pleural contractions.

5. Of 1st test that case presents no evidence clinically of pyloric stenosis or history suggesting ulcer. Former possibly in some way inhibited by interference with gastric innervation (?).

Exam. 1st Floor 9:00 a.m.  
2nd " 3:15 p.m. - 6 1/2 hrs.

(Gastric tonus poor. Pyloric tone "over good".)

Ray.

No I.C. vol.  
On palp. most vig. I.C. (1).  
Cap only, very slight.  
Later palp. most vig. none.  
Cap not well visualized.  
Ring not well visualized.  
Hyperperistalsis trans. (1).

Ray.

No I.C. vol.  
On palp. most vig. none.  
Later palp. most vig. none.  
Cap not visualized.  
Ring not visualized.  
Hyperperistalsis more or less constant (1).

Stomach large amt. (3).  
& ileum very slight at 6 1/2 hrs.

Clinical Diagnosis

Pul. T.B. Reflex gastric symptoms. Chr. constipation.

Dr. Fred T. Murphy, Barnes Hospital Nov. 24, 1915. High grade gastric dilatation with considerable hypertrophy. Mass involving first part of duodenum distal to pylorus. Every appearance of being ulcer.

High grade pyloric stenosis. Post-prior gastrojejunostomy under local anesthesia.

X-Ray Diagnosis

Gastric motor insufficiency from high grade pyloric stenosis resulting in gastric dilatation. Extreme contracture of thickened left pleural with resulting compression of lung and dislocation of heart into left thorax.

Stomach at 6 1/2 Hrs.

Cap not visualized on vig. palpation.

Fig. 7.—Case report illustrating extreme gastric dilatation and atony following duodenal ulcer stenosis of high grade. The stomach is low, considering the habitus of the individual (sthenic), *i. e.*, actual gastropothesis. Such a dilated stomach is characteristically large (contrast meal plus retained gastric secretion and ingesta). Gross gastric retention is indicated by the 6 1/4 hour residuum (on left), but more positively by the almost negligible amount of bismuth in small intestine at such time; this on account of sedimentation of bismuth in stomach.

sis and other complications, cases with slight stenosis; as shown by slower total gastric motility for type, and cases where the general physique is markedly asthenic. In such subjects non-stenotic duodenal ulcer not infrequently occurs associated with a considerable degree of gastric atony as judged by the usual standard, *i. e.*, gastric form and manner of canalization. Other complicating conditions causing atony, such as hemorrhage and inanition, modify the stom-



ach form, though such differs from that obtaining in stenosis, as the factor of dilatation is absent.

Changes in the form of the first portion of the duodenum or cap as a direct result of ulcer therein have justly received much attention. Cap deformity is by far the most valuable and constant diagnostic indication of duodenal ulcer either clinically or roentgenologically. Callous ulcer situated in the first portion of the duodenum is impossible without characteristic and persistent anomaly

Rating of Exam. ( 2 ) o Barium

**X-RAY EXAMINATION REPORT**

Page 1

No. \_\_\_\_\_ Exam. \_\_\_\_\_ Name Otto Diefenbach

Cad 3) Barnes Hosp. & G-E Clinic. Plates Stom. 1 (b); motility (b) Box #186.

Habitus Hypo to ansthetic

Notable Findings: \_\_\_\_\_ Date Oct. 1, 1915.

1. Stomach corresponds to habitus; possibly little low. Note stomach rather median.

2. Gastric motor insufficiency, large residue at 15 mrs. free initial motility at one stage suggests spasm a factor (v).

3. Probable cap deformity, contracted in lower zone contiguous to pylorus. Lengthened pyloric isthmus.

Exam. 1st Fluor. 12:45

Gastric tone poor. Pyloric "tonus" over good for type.

Barium & Water.  
No voluntary initial clearance.  
On palpation voluntary initial clearance (2) cap & duodenum. Later palpation free initial clearance (1) cap & duodenum; tendency to lag.  
Cap seems contracted in lower zones.  
Ring seems good.  
Hyperperistalsis (transitory) immediate (1).

Barium & Ferri-lac.  
Voluntary initial clearance (1) cap & duodenum.  
On palpation initial clearance (3) cap & duodenum; large, active.  
Cap tends to persist; deformed, contracted in lower zones.  
Isthmus long.  
Peristalsis (3)

Clinical Diagnosis  
Duodenal ulcer probably involving pylorus.

Operative Confirmation {  
Dr. Fred T. Murphy.  
Oct. 4, 1915. Barnes Hospital.  
Large duodenal ulcer contiguous to ring.  
Considerable grade of stenosis. Stomach wall hypertrophied.

X-Ray Diagnosis  
Duodenal ulcer lower zone of cap. 70  
Gastric motor insufficiency. 90

Fig. 8.—Case report illustrating the fact that marked stenosis from duodenal ulcer contracture may occur without change in stomach form and position (habitus taken into consideration); this where a considerable degree of gastric hypertrophy has occurred.

as to the form of the cap at times added to by spasm (Fig. 10). Hence as has been emphasized, a perfect cap means no callous ulcer. As has also been observed, deformity may occur as the result of adhesions not due to ulcer (Fig. 11), and purely spasmodic changes in form may be so persistent as to be very difficult to distinguish (Fig. 12). The contention that small ulcers can exist without cap deformity is in dire need of illumination through illustrated specific case reports. The recognition of cap deformity has come through

the development of a plate method. I should like to make the statement that the fluoroscope with apparatus of the highest efficiency and suitable technique is very effective in the elicitation of cap deformity. Such includes a heavy diaphragm carefully shut down so as to include the cap only, an absolutely dark room, a large dose of bismuth in water, a heavily leaded stationary screen that will hang close against the patient, leaving both hands of the examiner

Rating of Exam. (3) of 6  
X-RAY EXAMINATION REPORT

Page 1.

No. \_\_\_\_\_ Exam. 2. Name Mrs. L. L. Lynn. (224).  
Case (36) S.W. Plates Stom. (S.W.) 1(a) 11(a) 111(a) IV(a) V(a)  
Habitus Asthenic to hyposthenic. " 6 hrs. 1(a) Box 210.

**Notable Findings:** Date Nov. 29, 1915.  
1. Stomach does not correspond to habitus; lower and more atonic than would anticipate. Exam 1st Floor. 9:00 a.m.  
This of unusual interest in case of duo. ulcer. 2nd " 2:00 p.m. - 5 hrs.  
where hypertonicity considered characteristic. 3rd " 3:00 p.m. - 6 hrs.  
Possibility that slight gastric motor insufficiency responsible for this (degree of dilatation ?), as (S.W.)  
6 hr. residue (small amt. (1)) present; however, an (Gastric tonus fair only.  
unobstructed initial motility against this. (Pyloric tonus variable;  
2. Gastric motor insufficiency (slight) (see "1" above); Initial good; later  
probably due to gastric myasthenia rather than stenosis. (fair only.  
3. Most marked and persistent cap deformity. (S.W.)  
4. Duo. ulcer secondary signs only fairly suggestive: (Gastric tonus fair only.  
moderate initial clearance (S.W.), marked duo. lag, no (Pyloric tonus poor.  
hypertonus or hyperperistalsis, in fact, almost no  
peristalsis in 30 min. exam. (fluor.).  
5. Tenderness at McBurney's; appendix retracted,  
6 hr. troch. examination.

**S.W.**  
No I.C. vol.  
On palp. I.C. (2) C&D.  
difficult.  
Later palp. I.C. (3) in  
part vol. C&D.  
Cap deformed.  
Ring isthmus possibly a  
little long.  
Peristalsis trans. (2).  
219.  
I.C. vol. (2) C&D.  
On palp. I.C. (3) C&D;  
peristalsis; tendency to  
Lag 2nd portion duodenum.  
Later palp. same.  
Cap deformed.  
Ring perfect.  
Peristalsis (2)  
Stomach small amt. (1), small  
int-st. & ascending colon  
at 6 Hrs.

**STOMACH at 3 Hrs.**  
Cap persists, deformed; filled; pylorus canalized with great ease, in part vol. clearance.

**STOMACH at 6 Hrs.**  
Cap persists, deformed, with Lag 2nd portion duodenum (3). Pylorus easily canalized.

**Clinical Diagnosis** (Dr. Willard Bartlett, St. Luke's Hospital, 1/4/16.)  
Chronic atonic constipation. (St. Luke's Hospital, 1/4/16.)  
Gastritis hyperacida. (Duodenal ulcer, fibrous, slight gastric motor insufficiency. Probably functional rather than organic. (Ulcer 1 1/2 cm. distal to pylorus.)  
Ulcer (?) of gall stone. (stellate, at middle of anterior surface of duodenum. Depressed, contracted center 1.5 cm. below pyloric vein, about 1 cm. in circumference.)  
Operative Confirmation from it an old, fibrous adhesion extended to under surface of gall bladder. One hard gland in region of hepatic duct. Ulcer inverted. Posterior gastrojejunostomy

**X-Ray Diagnosis**  
(Callous duodenal ulcer. Slight gastric motor insufficiency. Probably functional rather than organic. (Ulcer 1 1/2 cm. distal to pylorus.)

Fig. 9.—Case report illustrating conditions possibly associated with slight (beginning?) stenosis from duodenal ulcer contracture. Such 'subclinical stenosis' not suggested clinically. As a result of such, a degree of gastric atony seems to have ensued which renders the stomach atypical as to hypertonicity for uncomplicated duodenal ulcer, and also for the habitus of the subject in whom it occurs. A small gastric residuum will be noted at 6 hours representing a slower total gastric motility than is characteristic for individuals of this type, though not a slower motility than is normal for asthenics (Fig. 4).

free for bimanual manipulation. This latter bimanual palpation is most important. It is necessary to turn the patient slightly, usually to the right, occasionally with better advantage to the left, so that the shadow of the cap does not overlies the spine. With such arrangement and manipulation the cap may be passively filled again and again developing its tiniest details. A great help, and in many individuals an absolute necessity to such a method, is the observa-

tion of the cap at an unusual time. In the first stages of digestion the duodenal cap fills only transitorily, emptying quickly. At the end of digestion when but little bismuth remains in the stomach, the cap remains filled for several moments at a time. (Also true of earlier stages in the digestion of the bismuth meal.) Under such conditions the small amount of bismuth remaining in the stomach does not obscure the cap. At this time the fluoroscopic examination is most satisfactory. When the cap is so determined to be full fluoroscopically, a few plates quickly taken will usually give all the information derived by many more taken during the first stages of digestion. At the very end of gastric motility the cap alone remains full for some moments while the stomach is empty (Fig. 12); also an admirable time for obtaining plates. An advantage of fluoroscopic cap observation at such time is that, by turning the patient, the cap may be viewed from many different angles, impossible in certain hypersthenics and sthenics with the stomach filled. Great help is also to be obtained by noting the irregular jerky manner in which the bismuth canalizes a deformed cap as a result of expression by manual manipulation. I do not wish to be understood as inveighing against the use of plates.

When postpyloric ulcer results in stenosis of considerable degree, the cap is not as a rule visualized. Occasionally on fluoroscopic examination, by patiently awaiting an opportunity when the stricture ring relaxes, a small amount of bismuth may be forced into the first portion of the duodenum sufficient to gain an idea as to whether the cap is deformed or not; of importance in differentiating duodenal from gastric ulcer stenosis; most important on account of the problem of malignant degeneration. Exceptionally a six-hour plate will show cap deformity (Fig. 13). Difficult cases are those in which the cap though small is not markedly atypical in form, for instance, cases where the contour defect is shown by a simple lengthening of the pyloric isthmus connecting cap and prepyloric area. Such may represent either duodenal or prepyloric ulcer. The greater frequency of duodenal ulcer is helpful in differentiating, for we must appreciate that stenosis is the complicating factor of duodenal ulcer, just as carcinomatous degeneration is that of gastric ulcer. Other cases where ulcer evidence is in the form of small incisura-like spastic defects or small irregularities of contour are at times difficult.

Certain peculiarities of gastric peristalsis occur in uncomplicated duodenal ulcer unanticipated before the advent of the *x*-ray. We have known of but one clinical condition resulting in visceral hyperperistalsis—namely, stenosis. In uncomplicated duodenal ulcer, gastric hyperperistalsis characteristically occurs immediately or shortly after the ingestion of the contrast meal, not only without stenosis distal to it, but with a decrease in the resistance normally



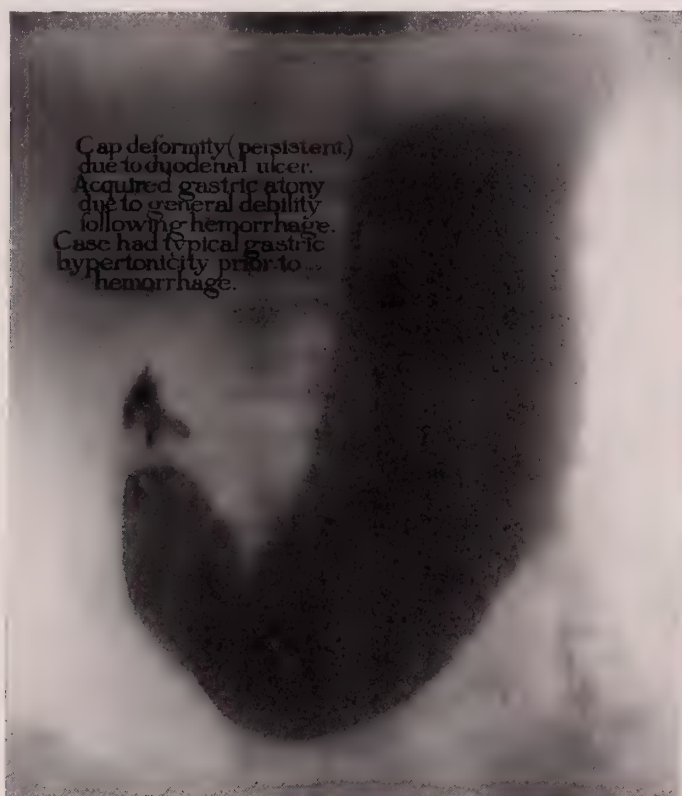


Fig. 6.—To illustrate acquired atony due to general debility; in this instance following severe hemorrhage. Subject showed typical hypertonic stomach prior to hemorrhage and in later examinations. In spite of the fact that a considerable degree of gastric atony existed (for type of individual—sthenic) the gastric motility was within normal time, *i. e.*,  $5\frac{1}{4}$  hours.

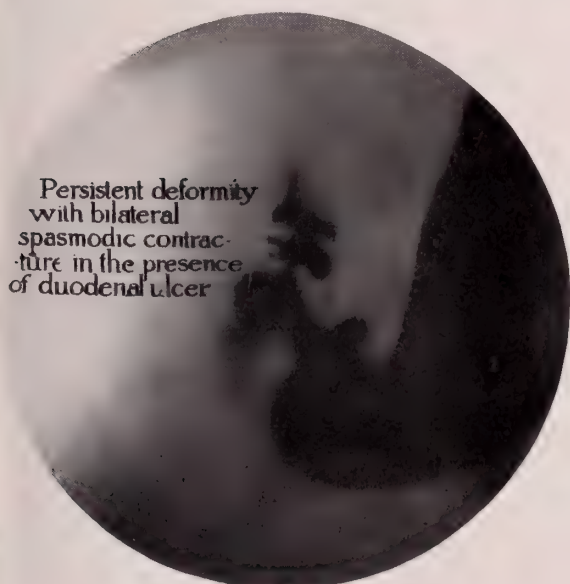


Fig. 10.

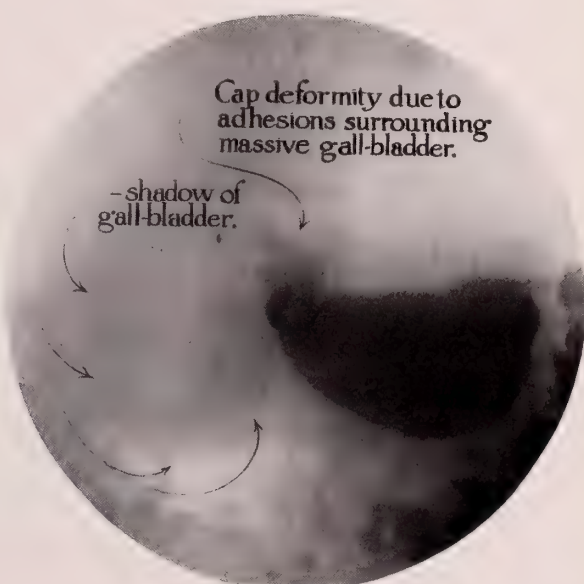


Fig. 11.

Fig. 10.—Plate showing marked cap deformity as result of duodenal ulcer, here in part due to local spasticities resulting in incisura-like defects.

Fig. 11.—Plate showing cap deformity due to adhesions from pericholecystitis. The resulting cap deformity is persistent and cannot be distinguished from that resulting from duodenal ulcer.



Fig. 12.—Plate showing persistent cap defect due to spasm (3 examinations, 15 plates, operatively confirmed). Also shows the usual condition when at the end of gastric digestion of the bismuth meal, the cap alone persists for several moments (has been noted as long as 10 minutes). Also shows conditions when duodenal ulcer pain has been noted as still present, indicating that such must originate in the duodenal bulb.

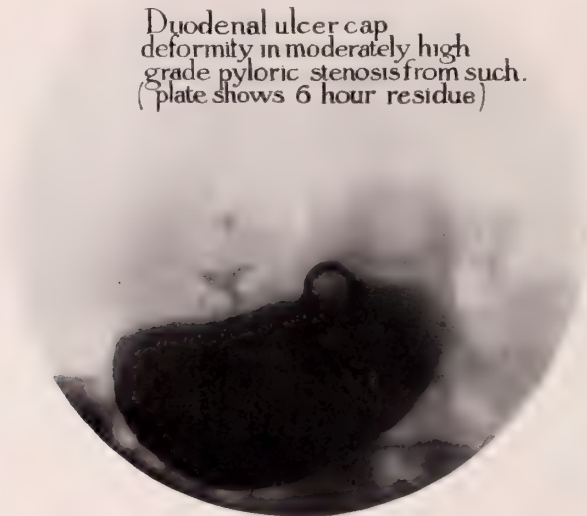


Fig. 13.—Duodenal cap deformity resulting from duodenal ulcer in the presence of high grade stenosis resulting from such. It is unusual to see cap deformity where marked stenosis exists as in this instance. Also illustrates that at times it may be of advantage to turn the patient slightly to the right so that the cap does not overlie the spine. The plate is here taken at the 6 hour period, at times and in certain types of individuals an advantage in demonstrating cap deformity.

offered by the tonus of the pyloric sphincter as manifested by the marked initial duodenal canalization. Diagnostically the sign is a valuable one.

If gross duodenal ulcer stenosis exist, hyperperistalsis is again the rule, though in such instance recognizable as increased peristalsis proximal to a point of stenosis. Its analogue is the visible peristalsis of clinical signs. The onset of such hyperperistalsis is later and more transitory than in uncomplicated cases.

In contradistinction to non-stenotic ulcer of the stomach, the total gastric motility is fast in uncomplicated ulcer of the duodenum. In stenotic cases total motility is of course delayed, the amount of delay being an expression of balance between the degree of stenosis and the reaction of the gastric musculature, as hypertrophy or atony. The delay is not always commensurate with the degree of stenosis, as a quite high degree of stenosis may exist without gross motor insufficiency where marked gastric hypertrophy has occurred. The *x-ray* furnishes a better criterion of gastric motility than the estimation of the degree of stenosis on the operating table. A six-hour residue after a standard contrast meal *on an absolutely fasting stomach*, without other complicating factor, such as gastric myasthenia from general inanition from various causes, congenital asthenia, or a gross filling defect, is a most valuable diagnostic sign indicating stenosis in the great majority of cases of duodenal ulcer origin, for we must learn to appreciate that stenosis is the complication of duodenal ulcer just as carcinomatous degeneration is that of gastric ulcer. In judging total gastric motility the habitus of the individual may be taken into consideration with advantage. In sthenics, the stomach empties about one and one-half hours sooner than in asthenics, *i. e.*, on an average of four hours. Should such a subject have a total gastric motility complete at six hours, at five and three-quarters, five and a half or even five and a quarter hours, such is proportionately significant of beginning or subclinical stenosis. Five and a quarter hours gastric clearance in full sthenics is equally as suggestive as seven-hour motility in marked asthenics. In keeping with the foregoing a six-hour residue in an asthenic is relatively less significant than the same in a sthenic individual. In asthenics of extreme type, a six-hour residue may occur without stenosis. The amount and position of bismuth in the intestines at six hours is as a rule, a better criterion of the degree of stenosis than the size of the gastric residuum, this on account of sedimentation in the stomach following the digestion of the fermillac. As a result, two gastric residues may appear of nearly equal size, but one case may show distinctly more bismuth to have passed into the intestines; evidence of a lesser degree of stenosis.

The cause of the characteristic pain of duodenal ulcer is unknown. Conditions during duodenal ulcer pain may not infrequently be ob-



served by the *x*-ray. At such a time the following may be noted: First, in contradistinction to gastric ulcer but little remains in the stomach. Second, the duodenal cap is full as is normal at that stage of motility when pain occurs. Third, the pylorus is apparently not in spasm, being often actually open and the resistance of the sphincter to palpation not any greater than usual. Fourth, duodenal ulcer pain may exist when at the last the cap alone is full. Fifth, the degree of distention of the cap and its resistance to further distention by palpation does not indicate the existence of hypertension.

We may conclude from the above that the greater efficiency of neutralizing alkalies in duodenal ulcer as compared to gastric ulcer is due to the small amount of stomach and duodenal content present at the time (actual observation). That pylorospasm has nothing to do with causing the pain of duodenal ulcer (pylorus determined not to be unusually resistant to palpation and actually open in certain cases). Several patients were observed when in typical duodenal ulcer pain several hours after the ingestion of the bismuth meal. On such occasions a small amount of bismuth remained in the stomach with the cap full. A full dose of bicarbonate of soda was given with the anticipation that something might occur, *i. e.*, relaxation of the pylorus, with rapid emptying of the stomach as a result, evidence of relaxation of any gastric hypertonus present, etc. As a matter of fact none of these occurred; the stomach and cap remained just as before, though in a few moments the pain gradually subsided. Lastly, pain must originate in the cap (exists when cap alone is full with stomach empty). We must conclude that all indications are unfavorable to the idea that the pain of duodenal ulcer is due to hypertension in either stomach or cap, the so-called adequate stimulus of true visceral pain, but is due, rather to the nerve endings in the ulcer floor becoming actually and abnormally sensitive to excess of hydrochloric acid.

THE MODERN ROENTGEN RAY TREATMENT OF DISEASES  
OF THE SKIN.

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By H. H. HAZEN, M. D., of Washington, D. C.,Professor of Dermatology, Medical Department of Georgetown University;  
Professor of Dermatology, Medical Department of Howard University.

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The following paper is intended primarily to record my own results in the field of roentgen ray treatment of cutaneous diseases, and not as a review of the literature. It is proper to state that MacKee<sup>1</sup> deserves credit for the introduction of the modern technique among the American dermatologists.

The question naturally arises as to whether skin disorders should receive *x*-ray treatment at the hands of the roentgenologist or of the dermatologist, for both these specialists are laying claims to these cases. To treat any disease satisfactorily, the physician should have an accurate knowledge both of its pathology and its clinical course; hence it seems that this form of treatment should always be supervised by the specialist in diseases of the skin. It is much easier for the dermatologist to acquire a proper knowledge of *x*-ray technique than for the roentgenologist to gain a profound knowledge of cutaneous disorders.

As is now well known, there are two methods of giving *x*-ray treatments—the old, fractional or divided dose method, and the new or single dose method. According to the old technique, doses were given at the interval of a very few days until the desired results were obtained. To avoid burning the patient the operator estimated the quantity of the ray given by the indirect method, that is by noting the amount of current that passed through the tube, the hardness of the tube, usually by means of the spark gap, the distance of the target from the patient's skin and the length of the exposure. This method was long, expensive, and frequently resulted either in an acute or chronic dermatitis. Then, too, it was noted that certain diseases, notably skin cancers, not infrequently became very resistant to the rays, and were sometimes stimulated to more rapid growth. It was very difficult for one radiologist to take up treatment where another had left off, inasmuch as it was impossible to tell how much ray had already been given the patient.

The new method consists of one, two or even three large doses, measured directly by special means. The treatments are much fewer in number, require fewer visits to the physician, are less expensive, do not produce undue resistance on the part of the lesion,

do not stimulate if correctly given, and do not produce chronic dermatitis. The treatments can, at any time, be resumed by another man who is familiar with the technique. The method is absolutely scientific, for the operator knows both the quantity and quality of his ray. The advantages are obvious.

Certain special apparatus is required for the work. While a coil fitted with a mercury interrupter will give good results, an interrupterless transformer is preferable to a coil machine, because any interrupter is a nuisance. The machine should have a large rectifying wheel and a spark gap of at least 9 in., as the use of a hard tube is unquestionably preferable to that of a soft one for routine work. Either a water cooled or a Coolidge tube may be used, but the latter is the better, as the vacuum changes but little during treatment, and one can soon standardize his tube so that he can tell to a nicety just the quantity of ray that is being delivered without the use of a pastille. This can be done by noting the distance of the tube from the patient, the amount of filtration employed, the current passing through the filament and the current passing through the tube. The tube should be kept cool by means of a blower that sends a constant current of cold air around its walls.

The quality of the ray is usually estimated by means of the Benoist penetrometer, which is simply a disc, composed of varying thicknesses of aluminum, arranged around a silver center. The most convenient way to use this little instrument is to place it upon a piece of ordinary developing paper, make a brief exposure, develop, and take the reading from the paper. The quantity of the ray is measured by means of the Sabouraud noire pastille, composed of barium platinocyanide. These pastilles when fresh are of a brilliant green color, which, when exposed to the action of the roentgen rays, changes to a yellowish brown hue, the deepness of the shade depending upon the quantity of the rays absorbed. One of these pastilles is placed upon the skin of the patient, rather than at half skin distance, and from time to time removed and matched up against a known color scale, just as one matches up a solution of the blood in determining the amount of the hemoglobin. This may be done against a known color scale, or against another fresh pastille that is placed beneath a tinted celluloid strip. This latter scheme is adopted in the Holzknecht radiometer, which is most generally employed. The one disadvantage of this machine is that the pale end of the celluloid strip is very liable to change color, and thus to become worthless. Because of this drawback upon the part of the Holzknecht machine it is more than possible that the new Corbett radiometer<sup>2</sup> may come to be recognized as the best. Pastilles should be kept in a humidor in which is a bit of dampened cotton. If too much moisture be present, the pastilles will drop off the mounts, or the mounts will swell so that they cannot be in-



serted into the radiometer. If kept too dry the pastilles lose their accuracy, but when correctly kept they do not change in color value. Readings should always be made by artificial light. When exposed to daylight a pastille changes back to a shade that is very near the original color, so that one may be used several times, except for very delicate work. As measured by the amount of skin reaction it is probable that the percentage of error in determining the quantity of the ray is well inside 10 per cent.

A hard tube is preferable to a soft tube, because there is much less danger of irritating the skin with the same dosage. Four units of a soft ray will frequently cause a marked erythema, while six units of a hard ray will cause no appreciable redness of the skin. The question of filtration is also of importance, for a filtered ray will not burn so readily as an unfiltered ray, inasmuch as the softest rays are removed. For deep therapy it is customary to employ 3 mm. of aluminum near the tube, and a sheet of sole leather next the skin, in order to cut out the secondary radiations from the filter. In superficial therapy it has been customary to employ no filter whatever, but I feel that it is always more safe to use from two to four layers of chamois next the skin. I am now working with one millimeter of aluminum and two layers of chamois, and while the dose is necessarily somewhat larger, at the present time I fail to note any difference in the therapeutic effects, even when tried upon different portions of the same lesion.

The room in which the patient receives treatment should always be well ventilated. It is thought by many that the ozone generated from the high tension wires may be responsible for the malaise and occasional nausea that at times follows *x*-ray treatment. By many, this discomfort is believed to be due to an acid intoxication, and soda is accordingly administered. If the condition is really an acidosis, which has by no means been proved, it should be better to make use of glucose rather than soda. Alkaline solutions are also usually prescribed for the skin of the patient, in order to prevent dermatitis, but I am not convinced that they have any real value.

Since it has been proved that the *x*-rays can be deviated, the question of the protection of the operator has become a more complicated one, and it is generally believed that an ordinary lead screen will not suffice. In view of the power of the Coolidge tube it is necessary to use heavier lead than heretofore. Parts of the patient which are not to be exposed must be protected by lead. A convenient form is lead cloth. The tube should either be in a lead glass shield or surrounded by a lead rubber cloth.

In choosing radiation or some other form of therapy, several facts should always be remembered. In employing the roentgen rays, we are dealing with a powerful agent, whose powers for harm we are ignorant of. We do know that they will cause the forma-

tion of an excess of fibrous tissue, and that they will destroy glandular as well as some forms of diseased tissue. At times radiation over the parotid has seriously damaged that gland. The question naturally arises whether we may not seriously damage the patient by heavy exposures over some important organ. This question we are as yet unable to answer, but the possibility must always be kept in mind. We do know that in the numerous instances where radiation has been employed for ringworm of the scalp, no later trouble has manifested itself; hence it is probable that serious complications are not to be looked for.

The roentgen rays are of the greatest value in treating thick patches of squamous eczema, as well as acute exacerbations of chronic eczema upon the hands. In 8 cases of squamous eczema, the result has been excellent in all, but in two instances there were later recurrences that were likewise speedily controlled. In one case of very persistent papular eczema no result was obtained, although doses of varying sizes and of varying amounts of filtration were employed. One case of weeping eczema was made much worse. At the Freedmen's Hospital, similar results have been obtained by Dr. Van Sweringen. The dose employed varies from three to four Holzkmnecht units, administered with a tube of from eight to nine Benoist penetration, and filtered through from two to eight layers of chamois. A slight amount of browning usually results.

One case of severe disseminated seborrheic dermatitis was treated with two units of a hard ray, unfiltered. One exposure sufficed to eradicate the condition, and there has been no recurrence in a year.

Psoriasis, which resembles seborrheic dermatitis in so many respects,<sup>3</sup> will usually disappear after one dose of four units of a hard well-filtered ray, but will almost invariably reappear in from three to six weeks.

Acne vulgaris can often be cured by other means, but in stubborn cases the ray will nearly always act favorably for two reasons. First, a slight reaction causes a peeling of the skin and a mechanical cleaning of many of the follicular mouths, and second, the sebaceous glands are atrophied, and we all know that acne does not develop upon a dry skin. In the 5 cases of facial acne in which I have employed this form of treatment, the temporary results from one dose of three to four units, filtered through four layers of chamois, have been brilliant, but in all the cases there has been a slight recurrence, necessitating one or even two more treatments. Three cases of chronic acne of the back have been treated. Only in one case were more than two exposures necessary. In dealing with acne it should always be remembered that a slight overdose may cause atrophy and telangiectases; hence one must be very careful with his technique in these cases.

Three cases of lupus vulgaris were treated. In one of these the result was excellent, and has remained so for six months. In another case there was marked temporary improvement but a speedy relapse, while the third case was lost sight of after having been somewhat helped. Large doses, sufficient to cause a reaction, should always be employed, usually from five to eight units, well filtered.

In 5 cases of tinea tonsurans the results were splendid, the hair dropping without any dermatitis, and returning in about three months. It is much better to epilate the entire scalp, inasmuch as falling hairs are always infectious, and if only a small patch be done the disease is almost sure to be spread when the hair falls. The dose should be five units, filtered through two layers of chamois.

Chronic lesions of lichen planus, either of the usual or of the hypertrophic type, will yield to one dose of three units. The two cases in which this was tried cleared up very promptly, and the distressing itching was almost immediately relieved.

Common warts are always favorably influenced by the rays. They can be cured in two to three exposures of from five to seven units of a hard, thoroughly filtered ray. In six instances I have not had a failure, although I have never succeeded in curing a case in one exposure, as MacKee has repeatedly done.

It is questionable whether or not the seborrheic or senile keratoses should be treated by means of the roentgen ray, for we know that these growths are largely the result of exposure to light, and to use so powerful a form of light as the rays, might seem to be inviting trouble in the future. However, in four instances I have caused these little lesions to disappear totally under one treatment, employing a six to eight unit dose, filtered through four to eight layers of chamois.

Keloids in the white race can always be flattened out by from three to five exposures with a hard ray, using a three to five unit dose. In the negro our results have not been so successful, as we have always been forced to employ larger doses, and thus getting a very considerable reaction.

It is in cancer of the skin that the most brilliant results of *x-ray* therapy can be seen, although it must be granted that at present we have no statistics of five-year cures to prove how this method compares with surgery. I am absolutely convinced that the method of treating small basal-celled cancers with divided doses of the ray does not compare in permanent cures with the results obtained by complete surgical excision. But we do know that the new method of radiation is a great improvement upon the old, and it is more than possible that the results will be an improvement upon surgery, inasmuch as it is possible to radiate a comparatively wide area. In dealing with cancers, we should always remember that



there are two important types of cutaneous cancer, the basal-celled growths, which do not metastasize, and the spino- or prickle-celled neoplasms which are very prone to form secondary growths in the draining lymph-nodes.<sup>4</sup> Hence it is absolutely necessary to make an accurate diagnosis before treatment is instituted, inasmuch as the latter type of lesion requires removal of the glands, just as does cancer of the breast or lip. In no instance should tissue be removed by the knife, but always by the cautery, or better by removal of the entire lesion. In certain instances it is possible to make the diagnosis clinically, without resorting to the laboratory. One may use the *x*-ray in basal-celled neoplasms or in inoperable spino-celled growths. Here a dose of eight to twelve units of a hard filtered ray is usually employed, and will almost invariably make a great change for the better in the growth, inasmuch as pain and discharge will cease, and a marked sloughing of malignant tissue will ensue. Small growths can frequently be caused to disappear by one treatment, while large or deep growths require from two to three treatments. Cases that have been previously treated either by the *x*-rays or radium do not respond so well to radium, and in addition are prone to burn much more readily. I have treated 9 cases of basal-celled cancer, 4 of which were operable and 5 of which were inoperable. Of these the operable cases are all apparently cured; one of the inoperable cases has been absolutely without symptoms for a year, and the 3 other cases have been greatly improved, so much so that it seems probable that cure will result. One case only was a total failure, and in this instance radium had been previously used.

The roentgen rays are frequently employed to stop itching, either that accompanying some dermatosis or a simple pruritus. In the former they are almost invariably successful, and in the latter I have had one complete success and one partial success.

The roentgen rays are not employed by the best men to remove superfluous hair, although this point has been much discussed. In 2 cases where I have employed the ray in deep work around the face, the hair has been permanently removed without damage to the skin by doses of from nine to ten units filtered through 3 mm. of aluminum and two layers of chamois. It seems probable that a technique along these lines will later be developed for the permanent removal of superfluous hair.

A comparison of the action of the roentgen rays with radium is interesting. While it is stated by competent physicists that the two varieties of ray differ in many of their physical properties, it is extremely doubtful if radium will produce any effects that the *x*-ray cannot equal. I have recently seen 3 cases of basal-celled neoplasms that were stimulated by the use of radium; in 2 of these cases

operable lesions were made totally inoperable. In view of the excessive cost of radium, the fact that it acts only close to its seat of application, the improper notoriety that it has received, and the bad results that I have seen from it, I may be a bit prejudiced, but I must confess that I am not kindly disposed towards it as it is employed at present.

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## BOOK REVIEWS.

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KOMPENDIUM DER ROENTGENAUFNAHME UND ROENTGENDURCHLEUCHTUNG. Von Ingenieur Friedrich Dessauer, Direktor der Veifa-Werke in Frankfort am Main, und Dr. med. B. Wiesner, Praktischer Arzt in Aschaffenburg. Zweite vollstaendig umgearbeitete Auflage. In zwei Baenden. Leipzig: Otto Nemnich. 1915. Price, 34 m.

The growth of the roentgen specialty is attested by these two volumes which are now necessary to cover what was formerly contained in one small book. There is a studied presentation of every roentgen activity. One looks in vain for an omission. There is no attempt to include roentgentherapeutics.

The first volume undertakes the physics of the roentgen ray, descriptions of energizing apparatus, tubes, etc. There is a splendid chapter upon the geometrical and physical principles of stereoscopic radiography and fluoroscopy by Wiesner. Dessauer contributes the chapters upon photochemical principles and practice with infinite attention to detail.

The second volume describes in detail the technique for exposures and fluoroscopy, and is contributed by Wiesner. There is no stinting in illustrations. Many new positions are shown, together with the simple accessories necessary for their practical adjustment. There is no attempt to introduce pathological interpretations, but the normal roentgen anatomy is brought out beautifully.

One is overwhelmed with the intimate attention and elaborate descriptions of technique in this work. If pathological interpretation had been introduced the work would have assumed encyclopedic size.

As in all German roentgen textbooks one finds much upon orthodiagraphy which is not reflected in American literature. There are pages of tables upon the measurements of the heart shadow. This subject probably offers great opportunity to the capacities of the German mind for detail statistics.

Up to the present at least, there has not appeared in the English language so profound an exposition of roentgen technique as these volumes by Dessauer and Wiesner. Not that there is any failing in capable English authors, but that there is little demand for such publications. English and American roentgen authors seem to leap immediately to the practical interpretative roentgen literature and leave the technique to manufacturers of apparatus and plates. And when it comes right down to the issue, roentgen technique is an awful bore. But in other battles, not walks of life, technique is what seems to win the battles, and probably we had better dig into this boring subject and pay more attention to the principles underlying technique.

And so we reiterate that there are 700 pages of roentgen tech-



nique in these two volumes, which would look well translated. Or better still it should prompt some of the capable American roentgenologists to rival and surpass this publication.

THE AMERICAN ATLAS OF STEREOROENTGENOLOGY. A Quarterly. Edited and Published Under the Sole Auspices of the New York Roentgen Society. Editors: Leopold Jaches, M. D., William H. Stewart, M. D., H. M. Imboden, M. D., With Associates and Correspondents Throughout the World. Troy, N. Y.: The Southworth Company. 1916.

"The American Atlas of Stereoroentgenology" is a quarterly publication edited under the auspices of the New York Roentgen Society. The editors are Dr. Leopold Jaches, Dr. William H. Stewart and Dr. H. M. Imboden, each one of whom occupies an established position in the roentgen world.

This "Atlas" appears in the same form as Case's "Stereoclinic Upon the Alimentary Tract" and Dunham's "Stereoclinic Upon Pulmonary Tuberculosis." It is published in loose leaves, the whole being enclosed in an attractive binding. The illustrations are altogether in stereoroentgenograms. The publishers state that each number will record about eight important cases and the descriptive text will begin with the earliest procurable history of the case and follow it step by step until it reaches the roentgen laboratory and, where possible, the interpretations will be verified in the operating or post-mortem rooms.

This first issue carries an introduction upon the stereoscope by Dr. E. W. Caldwell. There is also an excellent article upon Stereoscopic Dental Roentgenography by Dr. George M. MacKee. Nine case histories, with the stereoroentgenograms attached to each, are reported in this volume. The selection of this material is comprehensive and commendable. The cases reported are as follows: (1) Fracture of the skull; (2) brain tumor; (3) congenital stricture of the esophagus; (4) diverticulum of esophagus caused by osteomyelitis of cervical vertebræ; (5) multiple diverticula of the colon; (6) chronic appendicitis; (7) comminuted fracture of the right elbow; (8) stone in redundant ureter; (9) thymus death.

This publication is a bold undertaking, as it is an expensive proposition to produce such an artistic and scientific stereoclinic.

Inasmuch as this publication will appeal to roentgenologists, surgeons and internists, it is hoped that it will obtain sufficient support so that its publication may be continued. The character of the editors and the artistic quality of printed page and stereoroentgenograms, together with the educational value of the case reports, make this publication especially commendable to competent roentgenologists who should rally to its support.

VADMEKUM FUER DIE VERWENDUNG DER ROENTGENSTRAHLEN UND DES DISTRAKTIONSKLAMMER-VERFAHRENS IN UND NACH DEM KRIEGE. Von Prof. Dr. Hackenbruch und Ingenieur W. Berger. Mit 117 Abbildungen im Text. Leipzig: Otto Nemnich. 1915. Price, 6.20.

This small volume was no doubt prompted by the necessities of war, there being many who pursue the roentgen activities by rule of thumb where fractured and foreign body cases are multiplied on

the battlefield. This is really a roentgen primer, but a good one at that.

The second half of the book is devoted to the technique and application of the forcible extension clamps of Hackenbruch, which seem to have become quite popular as a means of maintaining ambulatory extension of compound fractures.

This apparatus has been described and illustrated by the author in a communication to the *Lancet* (March 14th, 1914), also in the *Med. Klinik* (January, 1915). These forcible extension clamps of Hackenbruch are adjustable metal affairs which are applied by means of a divided plaster cast. The adjustments permit all manner of changes in the degree of extension, and even the lateral mobility of the fragments, if the succeeding *x*-ray negatives show inadequate reduction. The author illustrates its application in all kinds of desperate compound fractures which ordinarily confine patients to their beds, but with Hackenbruch's apparatus they were immediately ambulant, which is a distinct advantage.

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## DENTAL DISASTER.

Energetic internists are grasping at infected tonsils and teeth with an alarming enthusiasm. No doubt these organs have been guilty of many remote infections. The tonsils seem to be quite rightly accused and convicted as primary offenders. The tonsils are wholly within the realm of medicine, and physicians need not argue tonsillar guilt with another profession. But the teeth—poor things—are being accused by physicians and defended by dentists. The dental radiograph has stepped in to promote the physician's case and to confuse the dentist. There is no doubt but that pathologists have shown that organisms, capable of remote infections, are found about the apices of diseased teeth. Consequently the physician is prepared to sacrifice the offending teeth immediately with the same assurance that he sacrifices tonsils, appendices and gall-bladders. But the dentist is not ready to see his pets sacrificed without a more thorough trial. He argues that infection about the teeth can be controlled by conscientious and painstaking dental surgery and that carelessly to extract these important organs places the individual at a distinct digestive disadvantage,

“ . . . . , puzzles the will  
And makes us rather bear those ills we have  
Than fly to others that we know not of.”

Hamlet, Act III, Scene I.

There appears to be little doubt, and dental radiography seems to prove, that there are more infections about teeth which have been the victims of American mechanical dentistry. Also it is true that dangerous granulomas arise at the apices of injured teeth without previous dental attention. Many contributions (notably Rhein's) appear to prove that these granulomas may be completely healed by proper aseptic root-fillings. Is it necessary then to sacrifice teeth and force the patient to bridges and plates? It spoils two good teeth to anchor a bridge, and unless the anchor teeth are aseptically prepared the patient has two potential sources of infection where one previously existed. Plates may be uncomfortable, distort taste impressions and require unceasing attention to cleanliness. Bridges and plates, therefore, interfere with digestion and consequently the health and happiness of the patient. The human

race as it is constituted to-day cannot hope to avoid the route of the *Dinosaur* if the teeth are to be continually sacrificed.

The teeth must be preserved and used for their original purpose of mastication or they will contrive to make trouble. Perhaps the increase in soft prepared foods for children prevents the development of sound teeth. It requires exercise to develop muscle and study to develop brains and, likewise, mastication to develop healthy teeth. Otherwise muscles become flabby, brains stagnate, and teeth lack resistance and become soft, inviting infection. Again, dentists have not generally appreciated surgical cleanliness—asepsis. They are where surgery was twenty-five years ago in the antiseptic stage. Dentists still seal antiseptic preparations in root canals to eradicate infections. This is contrary to accepted surgical authority.

It would seem that it is necessary to inject much which is known in surgical pathology into dental teaching and also teach dentists the principles of surgical asepsis. Failure along these lines has forced physicians to advise the sacrifice of teeth. The conflict is still waging.

E. H. S.

## ROENTGEN THERAPY IN CARCINOMA.\*

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By CHARLES A. PFENDER, M. D., of Washington, D. C.,  
Roentgenologist, Gallinger Memorial Hospital, Georgetown University Hos-  
pital, Sibley Memorial Hospital, Washington, D. C.

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The ideal treatment of tumors consists in the destruction of pathological cells without injury to the neighboring healthy tissues and without producing any deleterious effects on the general organism. This idealistic result has been obtained by roentgen rays and allied rays in certain groups of tumors. Modified results have been achieved in various other varieties of tumors also, but there are still other types of pathological growths which up to the present time have persistently managed to resist our most valiant efforts of intensive *x*-radiation.

It is generally believed now that *x*-radiation exerts a selective action on pathological cell tissue bringing about vital changes in these cells, such as an arrest of metabolism synchronously checking toxin formation and proliferation of cells, and finally producing a gradual cell destruction or necrobiosis. When this stage has been reached the detritus is absorbed by the organism.

In a large number of instances these pathological cellular elements are more susceptible to radiation than the normal tissue cells in their vicinity, hence these pathological cells are more readily influenced and even destroyed by roentgen rays without injury to normal adjacent cells. In other words, the *x*-rays exercise a selective action on tumor cells whereby these cells are destroyed, whether situated at the surface of the skin or deep within the tissues, without injury to the tissues most exposed to radiation.

In a comprehensive review of the literature one finds numerous authoritative reports anent the study of the histological changes within the cells of certain tumors that had been rayed. The first change was found to consist in an enlargement of the cells with distention of the protoplasm and nucleus giving rise to abnormal forms and structures. This was followed by granular degeneration and disappearance of these cells by absorption. In place of the tumor tissue there is left a tissue which is approximately more normal in type, usually sclerotic connective-tissue.

This happy result of roentgen radiation is unfortunately not obtained in all malignant tumors. There are certain varieties of tu-

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\*Read before The George Washington University Medical Society, January 15th, 1916.



mors which are influenced rather feebly by  $x$ -rays, and still others which are not at all amenable to radiation.

In those cases which pursue a satisfactory course under treatment clinical observation will show first an arrest and then a regression in the disease, when compared with the progressive march before treatment was instituted.

The effect is primarily a local one, the growth is diminished and occasionally disappears entirely. In some cases this reduction in size may be noted within a few hours after radiation; in other cases it will be several days before any notable change appears. Frequently the tumor becomes softer and more mobile. Occasionally the tumor enlarges upon radiation. This no doubt is explained by the cell enlargement described above, is only transitory, and is followed by atrophic changes.

Pain nearly always disappears promptly. In occasional cases it may be temporarily increased coincident with the immediate enlargement of the tumor mass preceding cellular disintegration. Secretions, discharges from wounds or ulcerations rapidly diminish and soon disappear. As the tumor is decreased the pressure symptoms in the neighboring organs recede, congestion, stasis and edema disappear, and displaced portions of the body are allowed to return to their normal position.

The general constitutional status of the patient is also elevated synchronous to the reduction in the size of the tumor mass. The cachexia disappears, appetite and sleep return, and the body weight is increased. In cases where fever is associated with a tumor, the former will recede in a ratio corresponding to the detoxication of the organism which is effected by a suppression of the toxic substances which up to this time were formed in the tumor mass and freely circulated in the blood stream. Now and then one may observe an increased disturbance in the general condition of the patient with increase in temperature. This is particularly true in cases where exhaustion and fever existed previous to radiation; it is transitory, however, and, in my cases, has lasted for not more than two or three days. In cases of very large tumors, even in hopeless cases, an improvement of the condition may be effected and a complete disappearance of the tumor brought about without any injury upon the organism or irritation of the skin. In the most favorable cases the tissues adjacent to the tumor remain unimpaired; not even a scar will be left to mark the site of the tumor which has disappeared entirely.

Not only are primary growths influenced so favorably in this way, but recurrences after operations and metastases as well.

If the affection is purely local and the tumor disappears entirely as the result of treatment, the patient may then be considered completely cured. If, however, hidden metastases are already present

and have been overlooked, which may happen so easily, the cure is deceptive. The general condition will be improved by the radiation of the tumor; usually the patient can return to work and life is prolonged; by the disappearance of the primary growth complications are also often repressed; but sooner or later tumors will begin to appear in other regions, anemia and cachexia recur, and finally the patient succumbs in spite of the apparent cure of the primary condition. This is due to the fact that the rays have no remote effect; only directly radiated areas are affected; distant hidden metastases are not influenced by radiation of the primary lesion. To influence these metastases it is necessary that they receive direct radiation; and when we recall how difficult it is to localize these accessory growths in many instances, we assume a heavy responsibility when we declare a person cured who has received treatment for malignant tumor.

My experience in the treatment of malignant tumors has shown that these cases are greatly improved by roentgen therapy, so much so that these patients consider themselves well. They are symptomatically well as the result of treatment, it is true, but they are not all cured. They have reached the point where continued monthly or bimonthly observation is still necessary; however they withdraw from observation, and sooner or later recurrences follow. I have in mind a case of inoperable uterine carcinoma which was in extremis when referred to me in June, 1915. Most intensive radiation was done immediately, the entire treatment being divided into two sittings on successive days. The patient experienced no unfavorable constitutional effects and the control of hemorrhage by judicious uterine packing offered a favorable prognosis. This patient improved marvelously. She was sufficiently improved within eight weeks to attend to her household duties. This, in my opinion, was the time to do a hysterectomy followed by post-operative radiation. It has not been done. The patient is still well, perfectly satisfied with her present status, and free from symptoms, but I anticipate a recurrence. This is merely an illustration of some of the difficulties we encounter in our efforts to produce a permanent cure. Cases of this type have been entirely cured by roentgen therapy alone, it is true, but these are not so common as to encourage us to feel that surgical measures need not be combined with radiation; and the most progressive roentgen therapists insist on absolute surgical control whenever a former inoperable cancer has been reduced by radiation so that an operation can be done without danger to the patient.

A word with regard to special roentgen technique in carcinomata. In epitheliomata one should apply an intensive radiation dose without filter when the area is small. If the area involved is large, and the center probably extends into the deeper tissues, about double

the dose may be given through a thin filter. Although the affection is situated superficially, large doses are necessary, as the cancer tissue possesses only a moderate degree of radio-sensibility. Should decided improvement fail to occur after the first radiation, an intense deep treatment should then be given. If after several treatments, at intervals of one month, no appreciable improvement is noted, the radiation should be stopped entirely. When a superficial cure appears to be effected, yet fails to be permanent, one should be inclined to suspect that the carcinoma extends quite deeply and spreads laterally and downward from this point. Over-dosage should also be avoided, as more harm than benefit could result therefrom. If, for instance, the center of an epitheliomatous growth, which has not entirely disappeared, shows normal connective-tissue granulations, this is a sign that local raying was excessive. Therefore, if excessive radiation did not effect a cure, a continuation of the treatment is strictly contraindicated.

In view of the slight radio-sensibility of carcinomatous tissue, superficially situated tumors, which appear to extend deep into the tissues, should be operated upon. If operation is declined, the tumor should be radiated from the beginning with as large superficial and deep penetrative doses as are possible.

Sometimes the given quantities of  $x$ -rays do not suffice to remove the cancer cells entirely. A certain amount of dosage dare not be exceeded, however, for there might follow fluid colliquation and necrosis, and in case of absence of some communication with the surface of the body the results might prove dangerous. Moreover, normal tissue, in which the carcinoma perhaps resides, may undergo severe degeneration and ulceration. Sinuses from body cavities, hemorrhages, infection and suppuration and regional edema, produced by such over-radiation, may prove serious. If the carcinoma in spite of this excessive treatment is not totally destroyed, it spreads rapidly in the impaired neighboring tissues.

Whenever the first radiations have been helpful, the treatment should be repeated after an interval of four weeks, employing the same technique. It is not safe to apply  $x$ -radiation sooner than that in these cases. The same technical rules are to be followed in the treatment of deep-seated inoperable carcinomata.

In the treatment of carcinoma the immediate vicinity of the tumor should remain free from lead covers, and in remote regions where we have reason to believe that metastases are likely to occur, special radiation should also be instituted.

#### SUSCEPTIBILITY OF CARCINOMA TO ROENTGEN RADIATION.

Carcinomatous tissue is more or less susceptible to radiation. It is much more susceptible than ordinary connective-tissue or blood-vessel walls, but it possesses a greatly reduced radio-sensibility as



compared with other tumors, such as most lymphomata and certain sarcomata.

To hope to cure inoperable cases of carcinoma with metastases by roentgen radiation is expecting too much; nevertheless these patients may be kept symptomatically well for a long period of time. Although radiation may not save their lives, perhaps they are at least made comfortable and their lives prolonged. The radiation of metastatic tumors is usually only a palliative measure in these cases, although Gauss reports a case of chorion epithelioma where autopsy showed that roentgen radiation had caused a disappearance of all disseminated metastases in the lungs.

One of the first effects of treatment consists in the disappearance of pain, no matter how severe, occasionally after a prodromal exacerbation. Even in unfavorable cases where the effect on the size of the tumor is but slight, one may observe the rapid and prolonged freedom from pain. In very rare instances the pain remains uninfluenced by radiation.

In the majority of instances there will occur a reduction of secretion, and even the cure of ulcers, leading to improvement of the general condition.

Reduction in the size of the tumor is often only superficial and inefficient, partly due to the slight roentgen susceptibility of the cancer tissue, partly due to variable susceptibility and inaccessibility of different parts of the tumor. This insufficient radio-sensibility of carcinoma explains why radiation will by no means remove all cancerous growths. One may say that practically all carcinomata, no matter what forms or wherever located, are favorably influenced by radiation; only a comparatively few cases are greatly improved or even cured; the location of the tumor is of the greatest importance in the consideration of a possible cure.

Inoperable carcinoma without apparent metastases may become clinically operable after radiation. Although one must assume that not carcinomatous, but purely inflammatory infiltrations in the vicinity were annihilated, it is nevertheless of sufficient importance to enable us not to consider these patients as hopeless, but to give them the opportunity of a thorough radiation. In fact these cases may be viewed in the light of curable cases through the medium of radiation.

Operable carcinomata should be divided into cases in which operation is followed by prophylactic postoperative radiation, and cases treated by roentgen therapy alone.

Gauss reports 79 cases of cervix carcinoma which received roentgen radiation after operation. Forty-three cases belong to the category of treatment without filters, being treated at the time when deep therapy was not well understood. Thirty-six cases were treated by filtered rays; only a few received several series of treat-

ments without filters as they came under observation during the period of transition. Of the 43 cases radiated without filters, 23 or 53 per cent. have died from carcinoma. Of the 36 filtered cases, 35 cases have been heard from, and all these 35 are free from recurrence. Although sufficient time of observation has not elapsed—the oldest cases only being six years ago—the difference in favor of the improved technique is proof of the prolonged effect of post-operative radiation, especially when we recall the fact that fully 60 per cent. of recurrences are observed during the first year after operation.

Cases of carcinoma treated successfully by radiation alone are also reported by Gauss, but the necessary three years required has not yet transpired. The most important fact is that radiation of carcinoma extending into the deeper tissues had succeeded in arresting the growth for a long period of time.

Superficially situated, thin carcinomata, epitheliomata of the skin, can usually be easily removed, most cases in one radiation; thicker and deeper masses may also be destroyed by proper therapy.

The greater the tumor tissue extends from the surface into the tissues, or the farther the growth is removed from the surface, the greater the specific weight of the superimposed parts, the greater will be the reduction of the penetrative radiation which has to pass through them in order to reach the tumor cells, and the more difficult will it be to affect the growth on account of the insufficient radio-sensibility of the deep tumor masses. Usually the effect is not sufficient, practically insignificant, but since the introduction of the Coolidge tube much better results may be expected.

When the tumor lies in a body cavity, readily accessible from without, it may be reduced by raying through the outer aperture of the cavity directly on to the tumor surface.

We must also consider the base from which the carcinoma springs. It has been noted that cases with carcinomatous infiltration of the musculature, of fascia, or even periosteum and bone, are not so favorable for roentgen therapy. Carcinomatous metastases in superficial lymphatic glands react, on the other hand, quite promptly, as a rule. Primary growths, as well as recurrent tumors and metastases, can be most beneficently affected by the rays, and, in certain cases, even entirely removed.

When regional gland metastases grow smaller rapidly after radiation, it is due no doubt to the fact that we are dealing with young, hence very radiosensitive, cancer cells and, in great part, with associated chronic inflammatory infiltrations.

An important point in the treatment of carcinoma is the necessity of large doses of rays. Small doses of radiation can not cure. The largest possible doses should be administered and the slight transitory general disturbance that may accompany some instances

of radiation are utterly insignificant as compared with the possible ravages of a progressing carcinoma. That these large doses of *x*-rays have no bad effect on the constitution has been shown by numerous autopsies where a microscopic study of almost all organs was made, and in none were any serious changes found in the blood-forming organs and in the glands of internal secretions.

The effect of roentgen rays on carcinoma varies also with the location of the tumor in individual organs. Carcinoma of the esophagus, carcinoma of the mediastinal glands and lungs, carcinoma of the stomach and intestines, retroperitoneal glands, mesentery, liver, gall-bladder and kidneys are not sufficiently affected by radiation, unless the Coolidge tube will prove a more reliable measure than we have had at our disposal with other tubes. Carcinoma of the pituitary body and cancers of the accessory cavities of the nose are equally unamenable to the desired result of radiation. Bassler, Doumer and Lemoines, and Pfahler and Rieder have reported most gratifying results from radiation in carcinoma of the stomach. My own results have exceeded my expectations by far. Werner and Finsterer also report favorable results, but none speaks of cures. Radiation is much more effective in carcinoma of the rectum, bladder, prostate and uterus. Cures can here be obtained, largely due to the ready accessibility of the growth.

Carcinoma of the breast is nearly always considerably reduced by roentgen therapy, but only exceptionally removed entirely. When the cancer tissue is thin, say several centimeters thick, with no deep infiltrations, nor regional metastases, cure is not very difficult, but the growth is rarely so circumscribed or so superficial. Unoperated cases give a better local and general prognosis than recurrent tumors; in the latter the tumor has usually extended deep into the tissues. Williams, Pusey, Leonard, Pfahler, Morton, Bécclère, Freund, Werner and others have reported cures of mammary carcinoma, but the number of cures is small as compared with the total number of cases treated.

Scirrhus cancer is very little affected by roentgen rays. On the other hand, Paget's form of mammary cancer is very susceptible to cure by radiation.

The surface cancers of the accessible mucous membranes offer a far less hopeful outlook than surface cancer of the skin. Carcinoma of the lips, eyes, cheeks and tongue, as well as of the rectum, clitoris, vagina and penis is quite refractory, but even in these regions cures can be effected by radiation as has been shown by Bécclère, Belot, Haret, Perthes, Wetterer and others.

#### INDICATIONS AND CONTRAINDICATIONS FOR ROENTGEN THERAPY AND SURGERY.

In those cases where the prognosis in case of an operation or deep roentgen therapy is equally good the tumor is probably curable



not only by operation alone, but also by radiation. In such cases radiation is to be preferred; for example, in purely superficial epitheliomata of the skin and mucous membranes or the superficial recent carcinomata which extend more deeply into the tissue.

In other cases, again, the probability of cure by radiation is doubtful, but good in operation. In these cases an extensive operation should be done at once. In this group belong innumerable cases of carcinoma in various locations and of different varieties, such as epitheliomata of the skin, which are adherent to their subjacent tissue, the periosteum, for instance.

In comparing the effectiveness of roentgen therapy and that of surgical intervention in carcinomata, one might generally do well to recall the statement made by Czerny in August, 1913—namely, that “three-fourths of the cases of carcinoma which are operated upon and offer more or less good chances for recovery develop recurrences, only one-fourth of the cases remaining free from recurrences.” In this connection we might state that Rodman found that operable cases of cancer treated by operation alone showed 25 per cent. of cures, while cases of cancer operated upon and treated subsequently by roentgen rays showed 50 per cent. of cures, and that this increase of 25 out of every 100 cases to 50 cases is due to *x*-rays. These figures alone justify the statement that deep roentgen therapy is indicated after every cancer operation.

We still have a third class of carcinoma cases in which both methods are doubtful or even bad, for example, longstanding, large mammary cancer infiltrating the thorax and with involved axillary glands and edema of the arm. Here one assumes that processes have already extended from the growth into the depth of the axilla and supraclavicular fossa beyond surgical reach, extending perhaps even into the thoracic wall or cavity, and also large, immobile abdominal tumors which appear to be firmly attached to their surroundings and hardly removable. If one or the other method would have to be excluded, the decision should be in favor of the use of roentgen therapy. If the conditions, however, are more favorable, one may apply both measures, usually first employing operative removal followed by deep roentgen therapy. Should the operation be an exceedingly difficult one and preceding radiation offer an improvement of the condition, the latter should be given the preference, and later, if it is still necessary, operation be done. Illustrative of such instances are certain uterine carcinomata with involvement of the adnexa, which primarily appear inoperable; after radiation the tumor frequently grows quite small, the neighboring infiltrations recede, and extirpation is then practical. Another example is cancer of the stomach with infiltration of neighboring organs, where the case appears inoperable; the tumor is rayed and later an operative procedure becomes feasible. Still another example is

Paget's type of carcinoma of the glands of the breast with extensive, but usually only superficial, carcinomatous infiltrations of the skin. The surgical removal of this large skin area would be impracticable, and therefore radiation should be done at once. The superficial infiltrations disappear entirely, as a rule, but often a carcinomatous area remains about the nipple. This apparently extends into the deeper tissues, and radiation does not always sufficiently affect it to cause its disappearance. Such a circumscribed area may readily be excised and, as the result of the previous radiation, the surgical procedure can be carried out in such a manner that the excision occurs within the confines of healthy tissues. In this manner formerly incurable cases are made amenable to effective treatment and are followed frequently by permanent cure.

In cases, however, where the tumor is inaccessible to the surgeon in view of its location, radiotherapy is indicated. This is also true in all cases where an operation is not advisable on account of the generally impaired condition, such as cardiac complications, cachexia, etc., and in cases which refuse operation. Radiation should be resorted to in all these cases, even though the result therefrom may be only an imperfect one.

The status of the Female Clinic at the University of Freiburg is as follows: Inoperable carcinomata are radiated in every case, even when metastases are noted. Operable carcinomata are only operated upon when the carcinoma can be removed without any serious danger to life, without severe functional disturbance and without impairment from a cosmetic point of view. In every instance the operation is followed by a methodical prophylactic radiation extending over months and years.

When an operable carcinoma is amenable to cross-firing, roentgen radiation is given the preference, especially in those cases where operative mortality or danger of recurrence has to be considered.

In conclusion I should like to quote a personal translation from an article by one of the greatest pioneers in deep roentgen therapy, Robert Kienböck, of Vienna (*Radiotherapie der bösartigen Geschwulste, Strahlentherapie*, 1915, Vol. 5, pp. 502-609), in regard to the significance or indication of roentgen therapy: "An era of marvelous progress has been ushered in by the development of penetrative radiation which furnishes us with a bloodless medium by which cancer and other malignant tumors may be caused to disappear in cases where operation might also prove of benefit, but especially in inoperable cases which otherwise would be considered hopeless. At the present time, unfortunately only the minority of cases of malignant tumors can be completely cured by radiation.

"Radiation therapy offers an ideal conservative measure; in favorable cases and with proper technique the diseased cells only are affected, that is to say, they are brought to a gradual decomposi-

tion and absorption without injury to the surrounding healthy tissues. Not even a scar remains. In addition, the radiation is painless, in fact entirely nonsensitive, so that the patients may enter into the treatment without fear, in wholesome contrast to the invariable painful and usually disfiguring operations.

"As regards the relative importance of radiation when compared with the operability of the tumor, the following groups of cases may be differentiated:—

"1. Totally inoperable cases, or those where the nature and the extension of the tumor to surrounding vital organs, or where complete inaccessibility prevents operation. Here radiation will often bring about improvement, sometimes even a cure. Although in some instances an insufficient reduction of the tumor is obtained, at least the pain is removed for a long time, and perhaps indefinitely, with betterment of the general condition, and for this reason alone the effects of roentgen therapy are not to be underestimated.

"2. In many operable cases roentgen therapy is more effective locally than operation. In certain sarcomata, all lymphomata and lymphosarcomata, also in apparent superficial lesions, radiation offers more, because it influences the deeper processes of the tumor, almost always present, which would have remained behind unsuspected or could probably not have been reached by the knife. Moreover, local recurrences are quite rare and when they do occur they appear quite late with the formation of very small tumors, even when the disseminated processes in the different parts of the body prevent a total arrest of the progress of the disease.

"Roentgen radiation improves the general condition practically in all cases by suppressing the formation of toxins in the tumors.

"Marked and long-continued improvement of the disease is obtained in certain sarcomata, in lymphomatoses and leukemia, where the demonstrable tumors are reduced in size and may even be caused to disappear entirely, thus enabling the patient to enjoy many years of useful activity.

"3. But even in those operable cases, that is cases which are amenable to surgical skill, where operation and radiation offer equal results of improvement or cure, roentgen therapy displaces operation as the result of its conservative character especially in cases where the operation is an extensive or disfiguring one.

"4. Again, the significance of combination of operation with radiation is worthy of note in many cases, particularly is this true in instances where any single method is not sufficiently effective. The greater portion of the tumor is excised first, as a rule, and the remaining portion is then extensively rayed. In many cases of this type the surgeons to-day frequently resort to operation where they formerly would have refused operation because the benefits of subsequent radiation were not then available. In other cases again,



radiation is resorted to first, as this reduces the size of the tumor and effects a demarcation by restoring the surrounding tissues; then the surgeon proceeds to extirpation.

"When the operator undertakes an apparently simple operation, but finds during operation that the tumor is not removable and that the extirpation of the entire diseased area would involve an extensive intervention, for example, amputation of an extremity, he would do better to stop the operation and resort to roentgen therapy; in many cases this will effect a disappearance of the remainder of the tumor. When metastases are already present in other regions, the patient cannot be saved, but he is at least spared a useless extensive operative procedure.

"5. In cases where operation has apparently effected a complete extirpation of the tumor, where, however, the future progress shows that some areas must have remained behind, as is evidenced by the appearance of local recurrences, prophylactic after-treatment with roentgen rays will prove of value, even when the remaining areas are only partly destroyed and the recurrences are only postponed for a time.

"In certain cases to-day the patient is rescued completely, either through the simple administration of radiation, or by the combined treatment, where in the earlier days no help would have been available.

"Moreover, the rays are far more effective generally in malignant tumors than any other measure that may be resorted to in aiding or displacing the surgical intervention.

"The past, almost complete helplessness of physicians in the treatment of inoperable cases has now been removed, and the patients who have lost all hope as the result of the failure of all other measures note an improvement under radiation and take fresh courage."

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## SOME X-RAY THOUGHTS OF 1915.

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During the year 1915, 1,165 private cases have been examined by *x-ray*, in all of which complete fluoroscopic and radiographic, serial and ten-plate observations were made. In this experience some thoughts and suggestions in this method of examination have come which may be worth relating. The *x-ray* method of examination of the stomach and intestine comprises a valuable addition to gastro-enterological diagnosis, and we owe much to the advance in it that has been made by American roentgenologists. It is my opinion that roentgenology in this country is superior with a larger number of men than in any other country in the world. Some unwarranted enthusiasms have quieted down to a normal significance. Controversy and argument still pivot around some individual matter hardly worth the while, which, as time goes on, will subside. It is unfortunate that practically no considerable advance has been made by this method of examination of other tissues of the abdomen than the stomach and intestine, in which considerable advance must still be made in small intestine conditions. The liver, spleen and even the kidneys (other than the silver salts injection work which has received somewhat of a setback because of danger of injuring the kidney tissue) are still comparatively dark to diagnosis by *x-ray*. Possibly they will continue to be because of the difficulty in outlining them, but it is hoped that improvement in technique and apparatus will be such that distinct shadows of the liver and kidney, together with ways of measuring the densities of these organs, will be advanced. It would be helpful if there was some method by means of which a gall-bladder could be outlined constantly. It is possible that it may be found that some chemical substance taken by mouth would be resorbed into the portal circulation and carried into the bile-ducts, thus having the effect of obstructing enough to cast a shadow that would contrast the bile sac with the surrounding tissue, or it may be that improvement of technique or apparatus would bring this about in another way. It is evident to me that the *x-ray* diagnosis will not fill the complete gap in all gastro-intestinal cases between the internist's history and physical examination on the one hand and the surgeon on the other. There are a number of conditions not possible of diagnosis by *x-ray*, some even simulating surgical cases, in which ample experience in abdomen work and the

advisability of an active scientific laboratory are helpful. The tendency of belief seems to be that in cases which are essentially chronic *x-ray* examinations will point out what surgery is indicated, rather than whether it is indicated. A number of such cases in which no surgical diagnosis can be made are still not covered by medical men in the assistances that could be given when more attention is paid to the biological aspect of digestive disturbances. A point of importance is, that a surgical diagnosis made by an *x-ray* man should carry plain reasons for the symptoms an individual has come under observation for. Cases are being diagnosed by roentgenologists as chronic appendicitis and others where operations are suggested, which operations have not benefited the patient, although distinct pathology had been met with and removed at the operation. I have met with cases in which one *x-ray* man diagnosed gall-stones, another chronic appendicitis, another, adhesions at the hepatic flexure, and so on through several combinations, each one feeling that his definite finding was responsible for the symptoms, and yet when each of these organs had been operated upon at different times, and the abdomen made perfect from surgical and *x-ray* standpoints, patients were still not well and were not simple psychasthenics or neurotics either. These were mostly found among the catarrhal and toxemic cases, errors of secretion, sensation and motility, dietetic mistakes for that individual, economic and sociologic misfortunes, food taintings, adulterations and bad cooking, gall-bladder conditions other than cholelithiasis, liver disorders, and not a few in persons who had been operated upon unwisely and no better or worse because of it, and those who had had unfortunate postoperative results. While *x-ray* examinations are most valuable assets to the work of surgeons, it must be remembered that accuracy of *x-ray* examinations is often judged by cases operated upon which are distinct clinical cases, that a large proportion of all gastro-intestinal cases are not conditions in which surgery could or ever will be helpful, and that while next to the history, the *x-ray* examination is valuable in gastro-intestinal work, there is much that the laboratory can do, which in many cases is of paramount importance. On the basis of my experience in diagnosis, and results accomplished in abdomen work, a general statement that "history is 50 per cent., the *x-ray* 40 per cent. and the laboratory 10 per cent. of gastro-intestinal diagnosis" (Mayo) is worthless and misleading to the fullness of the subject. It probably is true from a strictly surgical standpoint, but not to gastro-enterology completely, and after all it is the individual case that counts with all of us in what we can do to relieve or cure. In some cases the history alone is valuable, the rest useless; in the next it is the history, plus thoroughness in examination; in the next it is the history, plus thoroughness in examination, plus ample experience; in the next it is all of these, plus the



*x-ray*, or perhaps the *x-ray* alone, and in the next, all of these, plus careful laboratory procedures, or perhaps the latter alone. Like the strings on a violin they all count on what is brought about in the work. There are some roentgenologists who also do history taking, and others doing laboratory work in addition. These are mistakes from the standpoint of a normal and proper position of roentgenologists, because they dilute the strengths of their positions as specialists, and there is danger of some sides of a multisided work suffering. It takes years to make a good clinician, years longer to make a good gastro-enterologist, years to make a good pathologist and physiological chemist, not to speak of the years one must spend in a proper *x-ray* experience. Unless a number of star men combine in each of these sides in an organization, each having their due importance of positions, it is better for the *x-ray* man to do just his kind of work and let the clinical, laboratory and surgical sides for others to deduce his value from, and for them to go to him for what he can supply. The *x-ray* method of examination commonly is most valuable to diagnosis, but it is not all there is to it in abdomen work. This is a matter that should be understood by everyone engaged in practical medicine. It must come, and it might just as well be started here in print.

*Water Street*.—Some time ago it was pointed out that when fluid was drunk and the stomach contained considerable food, the lesser curvature separated from the stomach contents, allowing the fluid to run through into the duodenum. This was studied in 100 individuals with essentially normal stomachs, the suspension used being 60 gm. of barium sulphate in 200 c.cm. of syrup of acacia and water, this being drunk shortly after a full meal, and most of the observations made in five minutes. Five minutes' time was used up in each observation. Nineteen had a true 'water street' function, the rest retained considerable amounts of the fluids in the stomach, and in a large number it did not exist at all, the fluid exiting as chyme of the foods. Apparently it is not a uniform physiology, existing only in the minority of instances, in some only partially, and in others not at all.

*Pylorospasm*.—True and easily detected pylorospasm was met with a number of times. Most of these instances were gastric ulcer of the posterior wall or superior curvature and in the pars pylorica. In ulceration extending through the pylorus, and immediately beyond it in the duodenum, it was also marked. In my experience it is less often met with as a distinct condition in gall-bladder, appendix, and even most duodenal ulcer cases. In these it is distinctly less marked, more of a partial state, and liable to be seen later in stomach digestion (one or two hours) rather than early after taking *x-ray* meals as in gastric ulcer. In many instances it is of varying degrees even in the same individual at different times. Not a few

cases of the common pathologies in the abdomen, that cause it to be present, never have it. Together with it causing a degree of gastric retention upon which its presence can be noted (the pylorus in the anatomy and peristalsis being normal), the shape of the pyloric end of the stomach may be distinctive in ways other than just rounded. This in contour may be globular with a pointed pucker at the channel of the muscle, the observation (fluoroscopic or serial radiographic) may show a typically normal funnel shape to the outer end of the stomach but only small jets going into the duodenum, figuring this according to the height of the peristalsis, the time after the meal was taken, and its condition of gastric digestion in the way of easy exiting.

In studying a case for partial degrees of pylorospasm, one, two, or three hours after the *x*-ray meal is taken as uniformly good practice. Immediately after is usually too soon when it is not marked, and at six hours it is too late. Distinct moderate degrees of pylorospasm were met with in 4 cases in which apparently there were none of the well-known pathological causes. I still believe that it may be met with as a neurosis, although most of the time it heralds distinct pathology.

*Six-Hour Emptying Time.*—Carman presenting the experience at the Mayo clinic, in comparing the value of diagnosis between the *x*-ray and test-meal methods, presents the following: "A distinct residue after six hours from the barium meal given under conditions prescribed has been nine times out of ten, in our experience, indicative of grave pathology and usually denotes obstruction at or near the pylorus. . . . It would seem that the bariumized carbohydrate meal described is a more sensitive test for gastric motility than the modified Riegel meal as commonly used at the Mayo clinic." In the first place (since I was quoted by him), my position on the value of both methods was in comparing the tube test-meal method with bismuth meals, and it must be remembered that bismuth remains in the stomach longer than barium, upon which metal salt he based his conclusions. It is plain that while a stomach would show bismuth in it at six hours it may not retain barium, and consequently barium in the stomach at six hours means more definitely pyloric pathology than bismuth would. We did not use barium at the time the first edition of my textbook was issued (six years ago). Certainly since barium has been used in my private work (all of this year) but few instances of residues at six hours have been met with in non-obstructive cases. But even with barium, retention of 'distinct amounts' is being met with in which there is no pathology at the pylorus. Carman figures its accuracy as "nine times out of ten." What is the accounting for the one in which no pathology exists, or the ten in a hundred, and further, what is the size and density of the shadow of 'distinct amounts'?

Certainly small amounts of the original ingestions are not important, and every one agrees on considerable amounts such as we all see in distinct stenosis, and this even with the more tardy exiting bismuth. So far as safety in diagnosis by *x-ray* is concerned, it is wiser to discount six-hour residues of barium when the amount occupies only a small shadow in the stomach, distinctly localized well down or on in the pyloric region, and the head of the barium mass is ileocecal to the hepatic flexure. Using barium, I agree perfectly with him that the *x-ray* method, when 'distinct' residues at six hours are met with, is a more valuable means of diagnosis than the test-meal tube method, but I feel that we should not depend upon this simple means alone. All factors should be taken into consideration in an individual case, particularly the force of the peristalsis in conjunction with the rate and freedom of exiting—these observations being made at the time of ingestion. Then too, we must always take into consideration what the person had done from the time of the taking the barium meal to the sixth-hour observation. Did they partake of food or drink after the ingestion, were they up, and if so were they walking? All facts that would slow or hasten the exiting must be controlled. If you put a person on the left side it takes twice as long for every stomach to empty as when he or she remains on the right. Why then contrast one method with another when both are liable to the same errors, considering these up to moderate retentions, such as 10 to 20 per cent. barium (taking the area that the shadow covers as compared to the area that is noted directly after the ingestion), or just slight traces of food? A procedure of serial radiography, with perhaps not as many plates as Cole uses, should be the routine practice in most examinations of pyloric observations. To me no screen or retinae are sensitive enough for accuracy here.

With barium, gastropototic and atonic stomachs (no pyloric stenosis) are commonly emptied at six hours, which is not so uniformly the case with bismuth. Consequently the position of Satterlee and LeWald (recorded in 1913 and on examinations by bismuth), namely, that a residue was noted in 50 per cent. of the cases, and that those showing a large residue after six hours "should be operated upon when diagnosed," should be modified using barium for the examination. Hence, 50 per cent. of gastropototic stomachs should not be operated upon. In my experience, and judging from benefits brought about by medical treatment, even diagnosed at the time of bismuth examinations, five per cent. would be nearer to the proper proportion of all. As a class of cases I adhere to my original opinion that operation upon them should be thought of very late in any. When people are poor, and cannot take the required care of themselves (which takes months of steady attention), a larger proportion may be operated upon, but with those in



good or moderate circumstances, operation for the prolapse is rarely required. Finally, and in all justice to fairness, Crane should receive whatever credit there is in the use of terms to designate this extreme type of stomach. The term 'water trap' appeared in writings of Satterlee and LeWald in 1913. The first edition of my textbook had been out three years before it appeared. In it will be found a number of radiographs by Crane in which he used the term 'drain trap.' I think that in honor to a man who is a pioneer in radiography and a most conscientious and capable worker, Crane should have the credit for it, and terms like the 'water trap stomach of Satterlee and LeWald' should cease in the literature. More honestly call it the 'drain trap stomach of Crane' if such terms must be used, which are inelegant and unscientific, and are not conducive to the continuing of the elevated plane which American medicine now occupies.

*Compensating and Decompensating Stomachs.*—With the better understanding of cardiac conditions in what is now known of states from a functional power standpoint, these terms should come into general use with the stomach. It is not a trip into an aerial garden, theory or assumption, that these terms are important. There are stomach conditions in which decompensation exists, the condition bringing out added symptoms. Usually pathology exists as the primary cause, but a term like 'gastric ulcer, decompensated stomach' is worth something in practice and understanding. Peristalses fail for other reasons than just ulcer, stenosis, prolapse, etc. Some are cases of inherent disease in the stomach walls, others for neurological reasons, or as a factor in general states, and some for simple dietetic reasons. Most of these have local gastric symptoms, and if the terms suggested were used they would fill in a gap for a more complete understanding than now exists.

*The Neurotics and Chronic Appendicitis.*—From a strictly clinical standpoint, and because of better knowledge of the physiology of digestion, the *x-ray*, laboratory, and particularly neurology, the neurotic cases are becoming fewer in number. The *x-ray* method of examination has done much to select out those who have pathologies in whom distressing symptoms (sometimes general as well as local) have been considered as neurotic conditions. Most of these, in my experience, have been in the chronic appendicitis cases, sectional colitis, bands, kinks, etc., although not a few gall-bladder and ulcer cases were met with. Many of them, however, have been negative in important enough ways from the *x-ray* standpoint, and have been worked out to accurate diagnoses along the lines of knowledge of clinical medicine and the laboratory.

Several cases of chronic appendicitis with markedly diseased appendices and marked dilatation of the first and second part of the duodenum were encountered. Being able to rule out biologic condi-

tions by the laboratory (for chronic appendix cases are commonly those of intestinal toxemias in which the appendix is secondarily involved), and each of them having been carefully explored at operation, I feel definitely that some diseased appendices can reflexly bring about marked dilatation and atony of the first part of the duodenum. Three of these were examined late after operation and the measurements of the duodenum were distinctly smaller. It has been suggested that a dilatation of the duodenum in chronic appendicitis is brought about by a spasm at the duodenal-jejunal angle. Not only has this not been proved, or that spasm at this angle can occur under any conditions, but in this instance it cannot be the cause of the dilated duodenum. My reason for this is that if spasm at the angle caused the dilated duodenum, the entire duodenum would be dilated. In my cases only the first and a portion of the second part were involved.

It is well known that as a reflex from a chronically diseased appendix the motility of the stomach can be affected. Leaving out of consideration the cases of pylorospasm, a chronic appendix involvement can and usually is the cause of the wild and hysterical peristaltic phenomena seen in some stomachs. I have observed stomachs in these cases separate themselves in three or more ampulla, some of them disproportionate in sizes, and I have seen waves so complete and severe that as they ran to the pyloric muscle they actually contracted the organ so that there was the barest lumen. Whenever I observe wild and hysterical peristaltic waves in a stomach, a diseased appendix is suggested at once and the ileocecal region is most carefully examined in consequence.

*Ulcer.*—While the writer was the first to insist upon the direct or anatomical, rather than the indirect or physiological method of diagnosing gastroduodenal ulcer, a new complex was observed several times. This consists of—

1. A pyloric muscle channel situated superior to or in the upper half of the transverse measurement of the cap, and in diastole of the pylorus this line bends upwards at about the middle (these are due to contraction of the posterior or superior wall of the stomach in the pyloric region causing upward displacement of the channel).

2. A moderate degree of pylorospasm.

3. An irregularity of the contour of the stomach under the cap during diastole and its becoming regular during systole.

4. A considerable six-hour residue.

All these cases were operated upon and proved. More cases of hematemesis histories proved not to have had ulcer than had it. There was one case of papilloma of the cardia having marked hemorrhages, the x-rays being useless to diagnosis, the use of the esophagoscope making it possible.

*Gall-Bladder Conditions.*—I still am short of diagnosing directly the percentage of cases of cholelithiasis claimed by George, Cole, and others. After the greatest care in technique not more than one in three can be made out. Adhesions to the stomach and duodenum still are the best means of suggesting the presence of chronic cholelithiasis. After a careful observation of the point, and watching a large number of laparotomies in the Polyclinic Hospital, I do not believe that the hepatic flexure of the colon is involved in these adhesions, and if so it is very rarely met with. Therefore, I have given up studying plates for adhesions at this portion of the colon. If they do not exist toward the stomach they in all probability are not present running downward.

*Incompetent Ileocecal Valves and Ileal Stasis.*—The first were met with 139 times, in none of which cases was it deemed important and no operations were performed on this finding alone. It can be observed by *x-ray* in at least one out of every eighth normal person. Ileal stasis diagnoses are becoming fewer and fewer, and no operations were performed unless bona fide obstruction existed, all of which cases (24 in number) did well. The factors of physiological stops, and what would be normal for one individual and not for another, should receive more attention from *x-ray* men and surgeons than is general to-day. For in a diagnosis of ileal stasis in which surgery is done on the advice of the *x-ray* man, the surgeon definitely shares a large part of the responsibility of mortality and failure of beneficial result from the surgery. An enthusiastic, honest and conscientious surgeon should impress this upon his roentgenologist. The work of Lane and Jordan is now plainly much on the propaganda order, and the writer was the first (in writings) to draw this to the attention of those in this country. In New York City, where much of this short circuiting work was done, the instances are becoming fewer all the time. When definite obstruction exists it is justifiable, not otherwise. This has been my main contention from the very beginning against Lane's writings, and good medical results, on the one hand, and the operated-upon human failures, on the other, show plainly that the biology of digestion cannot be generally converted by changing the fecal current. Bands, kinks and folds that we are born with, unless obstructive, had best remain with us, for these cases do plenty well enough if time, care and patience are given to the medical handling of them.

*Sectional Colitis.*—Some attention should be given to diagnoses of sectional colitis, the diagnosis made by *x-ray* and the laboratory. There are many such instances and they are not being found generally enough. Most of them exist in the cecum and ascending colon, and surgery here is worth the while in a small number, but most of them are medical cases. The frazzled *x-ray* shadow in the colon, which some believe due to adherent mucus, cannot be depended upon



uniformly. There must also exist errors with peristalsis and states of atony in the location for the picture to be suggestive, which suggestion should be made positive by laboratory findings in stool examination and perhaps proctoscopic findings in addition.

These are a few of the thoughts of the year, to which this last one may be appended. There are a number of specialists doing *x*-ray work in connection with their office practices. Some of these are doing a good quality and deserve praise. Most of them, however, are doing it in a perfunctory or limited manner, and the results plainly show that they are not doing justice to what this means of examination can give when it is properly and thoroughly done and a competent knowledge of interpretation is on hand. Some of these will undoubtedly qualify as time and experience go on. But to those who, after considerable experience, have not or cannot for any reason, it would be fairer to patients (this means of examination), and to roentgenologists that they discontinue and refer the work to other hands. There is much more to roentgenology than apparatus and technique. There is the man with his experience behind these, his enthusiasm, the time he gives to it, and so on. Roentgenologists make mistakes in diagnoses. Who in medicine does not? But these mistakes in proportion are fewer and less important than those made by clinicians who do a poor quality of *x*-ray work and are depending upon it, and I, a clinician primarily rather than a roentgenologist, state this without hesitation.

## THE TREATMENT OF EPITHELIOMA OF THE LOWER LIP.

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By RUSSELL H. BOGGS, M. D., of Pittsburgh, Pa.,

Roentgenologist, Allegheny General Hospital; Dermatologist and Roentgenologist, Columbia, Pittsburgh and St. Francis Hospitals.

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Epithelioma of the lower lip, however innocent in appearance, is nevertheless cancer, and often shows a degree of malignancy that is not usual in epithelioma in other situations. It seems to be rather a regional than a local lesion. The lymphatics which drain it should in every case receive the same attention as the visible lesion. Until recently the best routine treatment has been early surgical removal of the ulcer and lymphatics. Until the introduction of the roentgen rays and radium there was no alternative treatment. Severe caustics would occasionally destroy the growth, but the resulting scar was large and retracted and the percentage of recurrence was very high. Even after clean-cut operation, results were sufficiently bad to lead the more careful surgeons to refer these cases for post-operative radiotherapy as a prophylactic against recurrence from lymphatic trunks that had been overlooked. To-day the general practitioner frequently refers these cases to the roentgenologist in the first instance rather than to the surgeon.

To the mind of some, the open question is whether they are justified in referring these cases for radiotherapy. In deciding this question let us consider the circumstances under which we have won our present position. In the quite recent past, the radio-therapist was necessarily untaught and inexperienced, for he was a pioneer. His supply of radium was insufficient, and his apparatus unstable. He was *compelled* to adopt the fractional dose instead of the massive single dose, universally regarded as superior by men of experience with both. Even with the fractional dose he was guided by the possibilities of his apparatus rather than by his opinion as to the amount of radiation necessary. In other words, he concerned himself rather with technique than with the principles of therapeutics. He was limited to the worst possible class of cases,—namely, those for which surgery had done its best or worst. Under these circumstances it is no wonder that we all saw cases said to have had innumerable roentgen exposures without the slightest sign of reaction, that we saw roentgen ulcers treated in place of an epithelioma, which had long been cured, and that we saw epitheliomas stimulated to more rapid growth and metastasis rather than improvement by the ray. Yet even so, radiotherapy demonstrated its superiority by not infrequent cures of recurrent or otherwise inoperable cases.

How different is the picture to-day. With radium, the powerful transformer and the Coolidge tube, the therapist administers with precision the single massive dose that his experience tells him is necessary. He concerns himself not only with technique, but also with the type of lesion and with the individual. He sees early cases in which a diagnosis is yet questionable; he sees cases a trifle more advanced after radical operation, in which he administers prophylactic radiation, as well as in hopelessly inoperable cases. He not only sees more cases in a year than any individual surgeon of equal-standing and reputation, but he works earnestly over many cases long after they have been abandoned by family physician, dermatologist and surgeon. He is in the best possible position to compare different methods of treatment from the standpoint of ultimate results. In short, he has a broader clinical knowledge of the subject than any other man. Should he, therefore, still be relegated to the position he quite properly occupied ten years ago as an adjunct to the surgeon?

It is quite frequently said at medical meetings that every cancer is curable at some stage by operative removal. This is perhaps a tactful thing for the roentgenologist to say. It pleases the surgeon and induces an agreeable mood of reciprocation. The only objection to this statement is that from the practical standpoint it is not true. If there is such a stage it is one that escapes the notice not only of the physician but of the patient himself. The untimely death from cancer of the tongue of one of the ablest of the present generation of Pittsburgh physicians is sufficient evidence of this. But, if further support is needed, I could quote figures collected by Murphy, and published in his clinics, showing that of the most favorable class of cases (those submitted to radical operation when there was as yet no evidence of glandular involvement) 52 per cent. died, finally, a cancer death.

Guided by these considerations, the writer believes radiotherapy, by means of radium and the modern roentgen tube, at present constitutes the best routine treatment of epithelioma both at the early and the late stage. Experience leads me to take a firm conviction that whatever position you may take to-day you will all ultimately agree with me in this respect.

There has been much haggling surgery of lip cancers; and it is hoped that this paper may not encourage haggling radiotherapy in the same field. The inexperienced, with recklessness solidly founded on ignorance, may burn a case; but he is scarcely more dangerous than the slightly experienced and over-cautious radiotherapist giving insufficient dosage which may stimulate the growth exactly in the same degree as an incomplete operation.

Epithelioma of the lower lip was discussed before the American Dermatological Society, many taking part, and it was concluded that



epithelioma of the lower lip could be successfully treated by radiotherapy provided the cases were selected by an expert, and the operator was qualified. All agreed it was a perfectly legitimate method of treatment, but that it was a method liable to abuse if it were not restricted to its proper field. We all know that lately many have been purchasing *x*-ray machines and radium tubes, and are giving all kinds of treatment without much knowledge of the subject. The six or eight weeks' course of instructions will teach many, so that they can make a few good plates. But their interpretation in terms of radiotherapy is another proposition.

That radiation, applied by a trained and skillful radio-therapist, will destroy epitheliomatous tissue has been definitely proved, and in cases of epithelioma, far advanced, it is the only weapon at hand for science. Miraculous as are its results in some recent cases, it cannot be expected to compensate for neglect of prophylactic treatment; precancerous changes, so well recognized clinically, must be regarded seriously, and in cases in which excision is advisable, radiation comes almost as an indispensable adjunct. Anyone who does not realize that he is treating a serious condition is not competent to carry out any method of treatment of epithelioma of the lower lip. Besides, he should have had experience before he assumes the responsibility by himself.

The technique, whether using radium or the roentgen rays, must be varied somewhat for the individual case. Scientific dosage should be regarded from two points of view—that of physics and that of therapeutics. Physical dosage may be fairly exact. Therapeutic dosage cannot be indicated with the same certainty. It not only depends on experience gained with a certain technique, but it also proceeds from a knowledge of the clinical character of the epithelioma and of the susceptibility of the patient. I prefer to use radium locally in epithelioma of the lower lip and ray the adjacent glands with a Coolidge tube. When using radium, a capsule is placed inside, one on top, and another on the outside of the lip. By so doing the whole area is thoroughly radiated. One advantage of radium is that it produces a more intense reaction which disappears much more rapidly than a reaction of the same degree produced by the roentgen rays. Usually the first reaction is sufficient to heal a lesion of moderate extent. The resulting scar must be healthy, pliable, without any retraction and without scaliness before a case is considered clinically cured. The treatment of the adjacent glands is most important and should never be omitted no matter how small the lesion. Partial removal of an epithelioma is to be condemned.

In an article, "The Local Application of Radium, Supplemented by Roentgen Therapy," which I read before the American Roentgen Ray Society, September, 1915, I explained in detail the value of the

combined use of radium and the roentgen rays, which is applicable in the treatment of epithelioma of the lower lip.

#### CONCLUSIONS.

Any method in the treatment of epithelioma must be one which completely eradicates every cancerous cell. Experience has taught us that an epithelioma in this situation is rather a regional than a local lesion. For this reason early surgical removal, wide and radical, has proved inefficient, because a recurrence takes place in over 50 per cent. of the cases, when there are no palpable glands at the time of operation, and in over 75 per cent. when there is any glandular involvement. All precancerous lesions should be removed by some method without leaving any scar whatever. Many believe the results by radiotherapy (meaning radium and the roentgen rays) are equal and even better than those by surgery, and that the removal should only be done in selected cases. There are a number of radio-therapeutists who have had sufficient experience in epithelioma of the lower lip whose results justify them in considering radiotherapy a perfectly legitimate method of treatment.

Too much emphasis cannot be put upon inefficient work, which is being done by those who have just bought apparatus and received instructions from the manufacturers. By a Coolidge tube, accurate dosage can be given, but it is dangerous in the hands of a novice.

## THE ROENTGEN TREATMENT OF UTERINE FIBROMATA.\*

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By G. W. GRIER, M. D., of Pittsburgh,

Roentgenologist to St. Margaret's Memorial Hospital, Pittsburgh.

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The roentgen rays were first used in the treatment of gynecological affections by Deutsch, of Munich, in 1904. He was immediately followed by Foveau de Courmelles, Bordier, Albers-Schöenberg, and in this country by Pfahler. The treatment became rapidly popular in Europe, the technique being very successfully developed by Albers-Schöenberg. In America the method found little favor and was seldom used except by Pfahler, whose reported good results were looked upon as being rather enthusiastically stated by the majority of American roentgenologists.

The reason for the apparent backwardness of American physicians in this respect was probably due to the slower development of *x*-ray tubes in this country, as before the advent of the Coolidge tube, the treatment could only be carried out with water-cooled tubes which were generally regarded here as being unreliable, and were little used.

The invention of the Coolidge tube and the wide publicity given to the work of Kronig and Gauss, of Freiburg, together have made the subject of 'deep therapy' a leading one to American roentgenologists.

The value of the *x*-rays in the treatment of uterine fibroids rests chiefly upon their effect upon the ovaries, although Albers-Schöenberg believes the tumor itself is also affected, the embryonal cells being destroyed and an endarteritis in the numerous blood-vessels of the tumor mass being brought about. It is generally recognized that the latter results are rather insignificant, the benefit being mainly derived indirectly through the action upon the ovaries.

The circulation of the uterus being influenced by the activity of the ovaries, the depressant action of the rays upon those organs is probably largely, if not altogether, responsible for the good results obtained.

The susceptibility of generative organs to the action of the rays is well known. It is doubtful if enough rays are absorbed, even in the massive doses now used, to cause much destruction of tissue in a fibroid tumor, the cells of which are not nearly so vulnerable as ovarian tissue.

After *x*-ray treatment, large fibroids often reduce to a very small

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\*Read before the College of Physicians of Pittsburgh, March 23rd, 1916.



size or disappear altogether. The reduction of tissue is too great to be due to direct action of the rays alone, and is mostly indirect from the action of the ovaries upon the uterine circulation.

Cases have been reported, however, in which favorable results have been obtained in patients past the menopause. The effect of irradiation upon the ovary is to produce first a destruction of the Graafian follicles. If the treatment is persistent the entire ovary atrophies and becomes sclerotic. Beneficial results can often be obtained by the production of the first condition named, and without the precipitation of an artificial menopause. There have been many cases of this nature reported.

Stern, of New York, has had a case in which the woman afterward became pregnant and was delivered of a healthy child. The objection has often been raised regarding this point, that active irradiation of the ovaries in a patient who afterward became pregnant might, or probably would result in the birth of a monstrous or malformed child. Stern's case and a similar case reported by Edelberg, of Munich, contradict this theory.

Although Kronig and Gauss have gone so far as to state that all fibroid cases over thirty-nine years should be treated by roentgenization instead of surgery, it is generally recognized that the treatment is only indicated when operation is impossible or undesirable. Some of these cases are extreme anemia, conditions of the heart, lungs or kidneys which do not admit of the administration of an anesthetic; cases going through the menopause in which the mental state is bad and in which the x-ray treatment facilitates this physiological progression. Roentgen treatment is contraindicated where there is coincident inflammatory pelvic conditions, where the tumors are of the submucous variety or where there is necrosis of the tumor, where there is a possibility of the presence of malignancy and where the patient is a young woman and the production of the menopause undesirable. The treatment is most efficacious in patients in whom the menopause is about to appear.

However, the author is convinced from personal experience that it is not necessary to produce the menopause to gain the desired results; also that there is no technical difficulty in the way of producing an artificial menopause in a young woman, since we have brought on that condition in a patient of thirty-six years after two sittings of six treatments each, the entire dose being 250 X Kienbock units.

The artificial menopause produced by roentgenization comes on gradually, the distressing symptoms and disturbed mental state of the natural climacteric are much ameliorated or absent, and the length of time over which the symptoms occur is much shortened.

As before stated, a large proportion of cases, especially those under forty-five years of age, in whom the tumors are not of large

size and long standing, will recover under *x*-ray treatment and retain the menstrual function.

This is irrespective of the degree of severity of the bleeding. Menorrhagia is perfectly controllable by this treatment; in fact, the first result noted is the diminution in the bleeding which often occurs after the first few treatments. The retrogression of the tumor goes on rather slowly, but it continues to diminish in size after the treatment is stopped. While the result from the point of size of the tumor mass is sometimes disappointing, if the patient is seen six months or a year later, the diminution during that period is often agreeably surprising.

Regarding the technique there is considerable difference of opinion prevailing at this time, largely brought about by the publication of Kronig and Gauss of the extreme doses used in their clinic, as high as 3,000 X Kienbock units being given to one case by what is known as the cross-fire method.

On the other hand, equally good results have been obtained by many leading roentgenologists (I will mention Albers-Schönberg as a concrete example) by doses very much less than these, about 300 X being an average, the radiation being given through large areas instead of the very small areas used in the cross-fire method.

The author has used both these methods with equally good results so far as he is able to see. The largest total dose given in one case has been 1,160 X given through 24 small areas, by the cross-fire method. The result was entirely satisfactory, and a permanent menopause was produced.

The smallest total dose has been 225 X given over 6 areas. The result in this case was a return to the normal menstrual function. Although the severity of the case will determine the dosage to a certain extent, we are inclined to believe that the very large doses of 1,000 X, for example, are seldom necessary and that indefinite multiplication of the ports of entry is of little value.

It has been our experience that the maximum skin dose (20 X Kienbock) given through 6 ports of entry (total 120 X) gives about the same results as if given through 24 ports of entry (total 480 X), and that this dose has to be repeated once or perhaps twice whether the large or the small dose is given.

This bears out the experience of many other workers. In fact, Kronig and Gauss themselves have just reported a new method of treatment in which the required dose is given at one sitting through one area only. A much denser filter (copper) than the ordinary one is used, thus obtaining very penetrating rays beneath the filter. These very hard rays have little effect on the skin, consequently the quantity of irradiation which can be given at one sitting is greatly increased.

The necessary dosage in this method is given in one sitting three

hours long. The advisability of subjecting the routine patient to such an ordeal as three hours of continuous roentgen irradiation appears to us questionable. Not only is the physical strain great, but there are also the extreme nausea and prostration which usually follow such intense irradiation. There are emergency cases, of course, in which it is advisable to give as much irradiation as possible in as short a time as possible; for instance, where the hemorrhage is very profuse, sufficiently so as to endanger life, as was the case in a patient treated by us. In this case, after the administration of 160 X at one sitting, the hemorrhage ceased in three days and never recurred. However, in the average case we would rather give the skin dose over one or two areas daily until the desired region is covered. In this way the series does not extend over six days at the most, and the patient is saved the disagreeable *x-ray* sickness spoken of by many writers.

In regard to the quality of rays used, we have preferred to adhere to the 10 Benoist first recommended by Albers-Schönberg. The Coolidge tube, of course, has made possible the use, in any quantity desired, of rays having a much higher penetration than this. With these harder rays it is possible to color the pastille or Kienbock strip in a much shorter period, but whether this really represents an increase in therapeutic efficiency remains to be seen. If it does not, the increased danger to patient and operator from the use of these very penetrating rays hardly seems justified.

With the means at our command to-day—modern transformers and Coolidge tubes—the production of an artificial menopause is a *safe and certain possibility* without the use of rays so penetrating that the operator is obliged to retire behind a foot or two of lead to retain for himself even a slight chance of completing his natural span of years.

In fact we are inclined to believe from our experience that the dosage commonly given is probably greater than is necessary to produce the required results.



## A CASE OF TUBERCULAR KIDNEY COMPLICATED WITH MULTIPLE CALCULI.

By LEONARD REU, M. D., of Buffalo, N. Y.

The value of collaboration of the genito-urinary surgeon and the roentgenologist is well illustrated in the findings of this case. The value of a diagnosis is dependent upon the amount of ingenuity expended in the proper direction. The diagnosis may be made by one or all the modes of procedure, and therefore a complete system of examination should be instituted. The case to be cited was referred for roentgen examination by Dr. James A. Gardner, whose case report is as follows:—

Miss A., occupation nurse; *æt.* twenty-six. First seen February 10th, 1916. Family history: No history of tuberculosis or malignancy. Previous history: Had scarlet fever in 1911. At that time her physician found a small trace of albumin in the urine. Since then has noticed, when she has had a cold, that she had pain in her left side. She thinks that when she was younger she may have had pain on that side. This is rather indefinite. First complained of smarting or burning sensation in the urine in the spring of 1915, which lasted for four days. Has not considered that she has been sick since her scarlet fever. Has felt tired out at times, but attributed it to having nursed a hard case. From time to time, when calling on her physician, she would bring a specimen of urine in which a slight trace of albumin was found.

Examination February 10th, 1916: Patient slight of build and not well nourished; heart and lungs negative. Catheterized mixed specimen showed pus in urine. Upon uretral catheterization pus found coming from the left ureter; right ureter clear. Tuberculosis bacilli found in the urine from left side. Phenolsulphonaphthalein test shows 15 per cent. from right kidney, 8 per cent. from the left in the first fifteen minutes, and 10 per cent. from the right and 5 per cent. from the left in the second fifteen minutes. Catheters passed without trouble on either side.

Pre-operative urological diagnosis: Tuberculosis of the kidney.

*Roentgen Examination.*—Left ureter catheterized. One c.cm. of opaque solution allowed to pass when patient complained of pain. Two roentgenograms immediately made. Fig. 1 shows one of the roentgenograms made at that time. Note the catheter containing opaque solution and multiple shadows characteristic of calculi. The one c.cm. of solution could not readily account for the multiple



Fig. 1.—Roentgenogram left kidney. A and AI, calculi; B, tubercular areas; C, pocket for AI.



Fig. 2.—Left kidney specimen showing multiple calculi and tubercular areas.

shadows, therefore the deduction that they were calculi. The patient returned in two days for examination without catheterization, at which time the left kidney showed the same findings and the right kidney normal. Fluoroscopic examination at this time showed clearly the condition present in the left kidney. Chest examination negative.

Pre-operative roentgen diagnosis: Multiple calculi.

Combined pre-operative diagnosis: Tuberculosis of the kidney with multiple calculi.

*Operation.*—Nephrectomy.

Pathological report of specimen by Dr. Simpson, of Gratwick Laboratory: Tuberculosis of the kidney with calculi.

Patient made an uneventful recovery.

1104 Main St.



## BOOK REVIEWS.

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**RADIUM, X-RAYS AND THE LIVING CELL.** By Hector A. Colwell, M. B. (London), D. P. H. (Oxford), Late Assistant in Cancer Research Laboratories, Middlesex Hospital, and Sidney Russ, D. Sc. (London), Physician to Middlesex Hospital. New York: Macmillan and Co. Price, \$4.00.

This is one of the best books upon experimental radiotherapy which has been published. It provides splendid information upon the effects of the  $x$ -rays and the rays from radium have upon living cells. As the authors state in the preface: "A large amount of interest centers around the action which the rays have upon malignant cells and some of the most detailed studies have been made by investigators in this connection. The results which have so far been reached are, one may venture to hope, a good augury for the foundations of a rational basis for radiotherapy. This subject is not approached from a clinical aspect, but data have frequently been selected from the details of clinical observation when these have borne upon the subject matter in question."

The first part of the book undertakes the physics of the roentgen rays and radio-active substances; the second part of the book takes up action of radiant energy upon certain forms of animal life, seed, plants, bacteria and the different organs of the human body, together with an elaborate description of the microscopical changes in the malignant cells following the application of  $x$ -rays or radium. There are also excellent chapters upon Idiosyncrasy and Dosage, Physiological Action, Selective and Differential action of the  $x$ -rays. To each chapter is attached a bibliography, as the authors have drawn largely from previous contributions upon the subject. This book is recommended to every one doing radiotherapy and to those who may be interested in the tissue effects of radiant energy.

**GUNSHOT ROENTGENOGRAMS:** A Collection of Roentgenograms Taken in Constantinople During the Turko-Balkan War, 1912-13. Illustrating Some Gunshot Wounds in the Turkish Army. By Clyde S. Ford, Major, Medical Corps, U. S. A. War Department, Bulletin No. 9, October, 1915. Government Printing Office, Washington, D. C.

This collection of 162 roentgenograms of gunshot injuries was made out of more than 1,500 plates assembled by Major Ford during a systematic visiting of the hospitals of Constantinople in the first Balkan campaign during the winter of 1912-13. On the page opposite each roentgenogram is detailed a short history of the case together with the projectory, the velocity, energy and the range of the bullet causing the injury. A careful perusal of this monograph is extremely interesting to roentgenologists in civil practice because of the conservatism with which these terrible wounds were treated. Major Ford says that wound treatment should be directed primarily toward the control of infection with only secondary regard for the correction of the deformity which should follow as a secondary measure after resolution is established. He states that all treatments should be based on principles applied on the following order: (1) Life saving; (2) restoration of function; (3) economy of the patient.

Roentgenologists who are familiar with the extensive excursions of modern operators in bone surgery will be surprised at many of the results which Major Ford reports after the conservative treatment of war injuries. Ford reiterates the axiom of Delorme, who says, "In order to avoid the excessive operative measures which have been seen in recent wars it behooves all military surgeons to practise the most uniform conservation." While none of the roentgenograms is a beautiful exhibit of the roentgen art, the roentgenograms nevertheless carry a remarkable lesson in conservative surgery.

THE MEDICAL CLINICS OF CHICAGO. March, 1916. Vol. I, No. 5. Philadelphia: W. B. Saunders Company. Price per year, \$8.00.

This issue opens with a splendid article by Dr. James T. Case upon The Roentgenologic Aspects of Intestinal Stasis. This is an extremely readable article and of vital interest to all who are attempting to interpret roentgen examinations of the intestinal tract. The remarks of Dr. Case are based upon over 7,000 gastro-intestinal examinations. The value of fluoroscopic palpation is commended because, as Case says, "with increased experience one pays less and less attention to the morphology, infinitely more stress being laid upon the function of the bowel." The comprehensiveness of this article prevents any criticism for omission. Case undertakes to explain the inadequacy of much of the recent surgery of the colon which has depended upon the idea that there are mechanical obstructions at the hepatic and splenic flexure or that constipation is due to atony of the bowel muscle. There are many other reports with roentgen findings in this volume, but the article by Case is well worth a year's subscription.

BONE GRAFT SURGERY. By Fred H. Albee, M. D., F. A. C. S., Professor of Orthopedic Surgery at the New York Post-Graduate Medical School and the University of Vermont. Octavo Volume of 417 Pages With 332 Illustrations, 3 of Them in Colors. Philadelphia and London: W. B. Saunders Company. 1915. Cloth, \$6.00 net; Half Morocco, \$7.50 net.

There is probably no doubt but what bone-graft surgery, as established by Dr. Albee, has created a perceptible ripple in modern bone surgery. Roentgenologists quite innocently become the critics of ambitious bone surgery; their roentgen negative files are frequently the graveyard of much experimental bone work. Roentgenologists soon learn that mere anatomical reduction is not the *sine qua non* of successful functional results, but the rationale of Albee's technique for autogenous bone grafts appeals to surgeon and roentgenologist alike. The success of these operations, however, is frequently a question of mechanical ability on the part of the surgeon, since there is no flexibility of tissue to afford the same latitude which the abdominal surgeon enjoys. It is worth while for the roentgenologist to give a studious reading to Albee's book, because it is profusely illustrated with roentgen plates carrying good interpretations and a description of Albee's technique in handling the various types of fractures, etc. Surgeons are depending more and more upon comprehensive interpretation of roentgen negatives, and it behooves the roentgenologist to prepare himself accordingly.

# SUPPLEMENT

ON

## ROENTGENOLOGY

(ISSUED QUARTERLY)

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## DEEP ROENTGEN THERAPY.

Much has been written upon the deep roentgen therapy of malignancy and allied conditions in the medical press, although no English textbook has as yet appeared. The textbook period has hardly been reached inasmuch as no hard-and-fast rules have been established. There has been no crystallization of the various individual techniques.

There seems little doubt but that there is an enormous amount of the so-called deep roentgen therapy where apparatus is not up to the recognized standard and where the technique is timid and faltering. If there is any one place in medical or surgical technique where courage is absolutely essential, it is in deep roentgen therapy. The lack of instruments and knowledge for the measurement of dosage is one of the chief causes of a timidity which is so detrimental to the patients.

Most malignant cases grasp any method proposed by an enthusiastic physician, be he ethical or otherwise. Probably one great reason why the cancer quack has flourished is because of his unscrupulous enthusiasm which arouses the fighting courage of the malignant individual. The ethical physician has had little reason to be enthusiastic in regard to possible results in malignancy until roentgen and radium therapy developed reasonable values.

This combination of enthusiasm, inadequate apparatus and technical ignorance will not promote roentgen therapy to the reasonable goal to which it is entitled. We see altogether too many new procedures in medicine and surgery attain an early oblivion because the enthusiasm of early trials, by those who will not read and learn of the originator's efficient technique, dies out quickly when the results are not paralleled.

It is not absolutely necessary that all deep roentgen therapy be applied by expert roentgenologists, but it is essential that those who would apply the proper dosage, filtration, cross-fire, etc., be trained to do this by competent teachers. Otherwise, this new method of attack upon malignancy is going to achieve an early disrepute and an unwarranted disparagement.

E. H. S.

## EDUCATION IN ROENTGENOLOGY.

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When honored by an invitation to contribute an article to this JOURNAL, the writer was in doubt as to what should be included. After some consideration, it seemed best to remain on familiar ground and simply express some views on the education needed in order that the public may receive the best service in this important field.

If the readers of the JOURNAL do not agree with the suggestions made, they are certainly excusable, but if some consideration of the general problem results, the writer will be gratified.

It is now a little more than twenty years since the notable discovery by Roentgen of the radiation that bears his name. In that time we have seen great improvements in apparatus for the production and utilization of these rays and a gradual development of the various applications. As far as our knowledge of the properties of the radiation is concerned there has been but comparatively little added to that given by Roentgen himself in the wonderfully complete and inspiring papers published in the years 1896-1897.

In the domain of physics there have been startling advances made as a result of this discovery; radio-activity and electron theory would scarcely have become familiar to this generation, at least, had Roentgen's investigations been delayed. As is generally the case, this new discovery has had a rather erratic history in its relation to medicine and surgery. Hailed at times with undue enthusiasm and rejected as misleading and unreliable at others, it is an open question whether it has suffered most from its opponents or from its advocates.

The great advancement of the last few years has been largely due to the introduction of the transformer working on alternating current in place of the induction coil operating on an interrupted direct current. Not only is the transformer much more reliable and easier to control, but the demand for larger output has forced the tube manufacturers to improve their product so that very much better appliances are available now than were deemed possible seven or eight years ago. Along with this improvement there has come increasing demands, not alone for better work but for more varied applications.

The development of the electric generators and of tubes has now

reached a point where changes are likely to be much less rapid than hitherto and where attention can be given to refinement in dosage measurement and to finer details of radiography and fluoroscopy. Especially should careful consideration be given to the proper training of roentgenologists if the public is to receive in full measure the benefits possible from this agent.

In fact the electro-mechanical facilities now available are very much in advance of the training provided for those who intend to utilize such apparatus. That this now constitutes a real danger can hardly be denied by one who is in touch with actual conditions. The writer has had considerable opportunity to observe installations and operators for several years and to answer questions from those in practice, and has noted with profound regret the lack of accurate information and the very limited facilities as yet provided for the instruction of those who are to handle so dangerous a tool as this has proved to be.

The most important single unit in any roentgen laboratory is without a doubt, the individual responsible for the conclusions to be drawn from the examination. There are at present two views on the status of this work, both of which must be modified before much progress is made. One of these relegates the entire work to the 'technician,' who is usually an untrained individual who can develop plates, has picked up some skill in timing exposures and is useful in the various minor details in a laboratory. To him is intrusted 'picture making,' as though the process was a mere mechanical detail, not worthy of serious attention.

One cannot insist too strongly that more depends on good judgment of the anatomy of the case in hand, on the particular sort of exposure likely to differentiate the parts in question, and especially on the ray direction and quality needed for the best diagnostic radiograph, than on whether this or that make of transformer is purchased. The turning over of hospital or private roentgen laboratories to the type of technician often found in charge, should be unsparingly condemned. This does not mean that a man or woman without a long and expensive medical training may not become qualified to do a large portion of such work, but this proficiency can only be attained by long association with a first-class man who has had training and experience and who can clearly state his wants in each individual case.

The other view, in many cases even more unfortunate, is that any one legally entitled to append M. D. to his or her name is qualified, without special training, to take charge of this important work. Not only has an almost endless series of cases been reported where the worst sort of diagnostic errors have been made, but a large number of serious injuries have been inflicted. A recent case is reported of death from such injury where an attempt was made to take a kidney plate by an inexperienced operator who



had been urged to buy and use a high power machine on the 'we will tell you all about it in no time' plan. The usual medical college training no more fits a man for this work than a course in theology would fit him for the practice of surgery.

It is not, however, the fault of those endeavoring to start in this field that they have been so poorly instructed; they have taken the most immediate offering, that of the solicitous agent for apparatus or plates. Some of this instruction has been of considerable technical value, much of it has been entirely misleading and exceedingly dangerous. Not intentionally so, of course, but the result is largely the same.

When men treating patients with roentgen rays report or prescribe "20 milliampère minutes of *x-ray*," or ask "How hot the target of a Coolidge tube will get before a burn will ensue?" or when a patient is severely injured by a fluoroscopic examination at an institution of considerable standing and the physician in charge expresses surprise as he used "only three or four milliampères and did not injure his tube," it is time for medical schools and authorities to give thought to the proper training of roentgenologists.

Reading even recent literature in electro- or radio-therapeutics, one can hardly fail to be impressed by the incompleteness of statement and the looseness of diction prevailing. In no other field of electrical application would this be tolerated. Almost the entire literature reads like medieval superstition; terms of standard technical meaning are used in ways certain to mislead, and this at once tends to discredit the work in a field of undoubted value.

Note the excitement of a year or so ago when a metropolitan paper published a long account of a new ray, one produced in some mysterious manner, of course, from a large and imposing cabinet. This new ray, while accomplishing the work of the roentgen ray, was said to be *entirely harmless*. One physician was reported as holding an active tube in his hand for an hour and "it did not feel the least bit hot." Hence no *x-ray* burn, etc. That so many roentgenologists should seriously consider such statements is an unfavorable commentary on their training and judgment.

The following are extracts from *recent* articles dealing with the important matter of treatment.

1. "This application should be immediately followed by the use of the roentgen ray, raying preferably through a *filter*, applying the ray at the first treatment for thirty minutes, the *x-ray* dosage measured by  $1\frac{1}{2}$  to 2 milliampères at 15 inches, or approximate dose measured by some other standard unit. A tube of medium (?) vacuum is preferred. The subsequent treatments are for fifteen minutes on alternate days until evidence of improvement in the general health of the patient indicates the destruction of the *germs* present, when applications of currents which will remove the infiltration and swelling may be employed."

2. "In indurated acne there is probably no agent so successful and effective as the systematic employment of the  $x$ -ray, as in the treatment of other skin conditions. Begin with the standard dose—2 milliampères at 15 inches—for thirty minutes *without* filters, employing a *low* vacuum, following it on subsequent days with ten or fifteen minute doses *until dermatitis occurs*."

3. "Use a medium hard tube, *aluminum filter*, distance from eight to ten inches, giving an exposure for fifteen to twenty milliampère minutes. The exposures may be made *every other day*, two or three treatments usually being the number needed."

In the first case the nature and the thickness of the filter is certainly indefinite. The phrase "destruction of germs" is seriously to be questioned in this connection. In the second, what is a *low* vacuum? and are inexperienced operators to be encouraged to cause dermatitis?

The well-qualified roentgenologist of to-day has acquired his knowledge piecemeal; developments and changes have been rapid and demands on time and money have been numerous. As the field enlarges, this mode of preparation becomes in many cases inadequate and is always wasteful of time and effort. What ought the medical schools to offer for the proper training of the workers in this field?

The writer has had some opportunity to study this question in the attempt to devise such laboratory exercises as are best suited to develop correct habits of work and to impress on students the points of fundamental importance. If any success has been attained in this endeavor, it is largely due to some earnest and progressive physicians who have been willing to experiment in this connection.

There can be no question of the value of an elementary knowledge of the physics of  $x$ -ray production and of the general laws of radiation. There will be found an actual saving of time when this is gained before attempting applied work. Following this there should be a *thorough* drill in handling machines and tubes and in making test plates of various objects. This should be continued until the relations of current, voltage, time and distance to the negative produced, are well understood. Great care should be used in the geometry of the shadows cast, using both fluoroscopic and radiographic illustrations. Special emphasis should be given to the accurate reproduction of tube settings; one unable to duplicate results in test negatives ought not to undertake treatment work, to say the least.

A course in  $x$ -ray anatomy should be developed. This should include the density and position of the various portions of the human body. Radiographs of skeletons and of living subjects should be studied as an integral part of the courses in anatomy and dissection. After careful consideration of the shadows in nor-

mals the variations indicating pathological conditions should be studied. The student should be warned against reading into a plate what he *thinks* he ought to see. He should be made to feel that the best negative is not good enough and only the very best should be used in the work of instruction. Always insist that *a proper negative or fluoroscopic image must be obtained before interpretation begins*. Full opportunity to study classified cases should be offered. If one can spend some days comparing bone lesions where operation or post-mortem has proved a diagnosis, much more can be gained than by seeing an *occasional* case.

There can be no doubt of the extreme value of operating-room experience following roentgen examinations, and every well-equipped institution should encourage their roentgenologist to follow up his cases. Such a course of training requires time, facilities and well-qualified teachers.

What is to be the status of the properly trained roentgenologist? The best public service will not be secured if his training and work are regarded as inferior to that of the physician or surgeon. In no sense should he be regarded as a routine photographer or should the value of his services be related to the cost of *x-ray* plates. He must be on the professional basis of a properly trained consultant, and having attained the qualifications, he may well insist on proper recognition. The subdivision of effort is a necessary result of the extension of knowledge; and only when men perfected in various branches of medicine and surgery come together for a rational discussion of the complex human machine, will medicine advance at a pace comparable with that witnessed along certain lines of engineering.

In this connection it may be remarked that hospital managements are often open to very serious criticism in relation to roentgenology.

The practice of appointing an eminent roentgenologist on the staff in a purely honorary or advisory capacity and having 95 per cent. of the work done by cheap labor and the negatives interpreted by everybody who happens along, is a discredit to all concerned. The business manager of a large metropolitan hospital stated with apparent pride that the cost per negative had been kept very low, the electrician made the exposures, a boy developed the plates, etc. Considered from the standpoint of service to the patients, it would have been far better to have done without an *x-ray* department; what little was paid out was a dead waste. In no field of human endeavor can real value be secured for nothing; certainly roentgenology is no exception.

In the education of all concerned there is need of a better understanding of the real value of material equipment. The questions so often asked are, "What is the best *x-ray* machine?" "Are the claims of the Q Company valid?" etc.

The apparatus for the production of this radiation was certainly



crude in the earlier years and its proper development was retarded by the lack of physical investigation of the actual factors involved in its production. According to the circulars of manufacturers and the tales told by agents, each firm had some special dispensation from Providence whereby *their* ray was perfectly adapted to the result required. This condition was in no small measure due to the unscientific attitude of many members of the medical profession who were and are 'easy marks.' Just as soon as users of this apparatus have reasonable judgment of what constitutes good equipment, the day of wasteful buying and the accumulation of junk will pass. While having occasion at various times to criticize selling methods and claims of manufacturers, the writer wishes to emphasize the statement that the greater burden of responsibility lies on the physician. During the period of rapid development such conditions are unavoidable, but their continuation should be discouraged. Enough is now known of the possibilities and also of the physical limitations of apparatus to rationalize both manufacture and instruction for operation. There is no more mystery about the physical production of roentgen rays than pertains to the production of light or power. The melting point, atomic weight, and ability of the target to conduct heat determine the power which may be used. There is no advantage whatever in having a machine output greatly in excess of what a tube will stand.

A good transformer outfit should be able to give up to 100 M. A. at 60 K. V. (effective). In order to allow for a fall in line voltage this should be met at 5 per cent. below rated voltage. The rectifier should operate without undue leakage when handling 10 milliamperes at a full 15-inch gap or about 75 or 80 K. V. (effective). It should not allow an arc between sectors at this voltage. The high tension wiring should receive more care than is seen in many instances. No portion of the high voltage circuit should leak to the cabinet, and the spark gap should be connected on the transformer side of milliamperemeter, so that leakage or an arc across the gap does not give a deflection.

The control apparatus should be convenient and simple. For radiographic work a nearly constant voltage outfit, *i. e.*, one which does not vary markedly with tube current is desirable. This should *not* be used for fluoroscopic or treatment work. Thus an auto-transformer or equivalent device is needed for radiographic work and a rheostat for treatment. The rheostat should be well ventilated and should not heat unduly when used with a Coolidge tube for heavy treatment or in softening a hydrogen tube.

The wiring should make it impossible to pass current through the transformer when the rectifier is not running. Also a red lamp should be placed in shunt with the transformer terminals and mounted where the operator can *plainly* see it. This serves

as a danger signal and also tends to protect the transformer from surges.

It must be clearly recognized that a given current passed through a tube with a given voltage drop, produces radiation at a fixed rate. Even with large differences in wave form careful measurement shows that the differences in amount and quality of radiation from various machines are of no consequence when the same effective voltage and current are secured. There are cases where poor design has made it impossible to get a proper range of voltage at suitable current, but such matters are easily tested. It is quite within reason to expect the manufacturer to supply a chart with a machine showing what voltage is *maintained* at the tube terminals for usable currents on the various rheostat or auto-transformer settings; and as voltage is much the more important factor this should be reasonably accurate.

In spite of the lack of grasp of fundamental electrical laws relating to *x*-ray production, competition and the unceasing demand for better results have led to remarkable improvement in appliances. While this progress has seemed slow and wasteful, it was, on the whole, certain, and while the selling methods and advertising of apparatus have been open at times to severe criticism, yet great credit is due to certain manufacturers for their efforts to improve their products, and American firms should receive praise for a large share in recent improvements both in generators and tubes.

As far as accessory equipment is concerned many good appliances are available and more special devices than are worth while. One should be supplied with a good machine, operated on a steady source of power, a good, simple tube stand, a fair number of tubes in good condition, a convenient vertical fluoroscope, and if possible a *simple* table for fluoroscopic and radiographic work. Much more attention should be given to overhead wiring, ventilation, freedom from moisture and vibration than has generally been the case. Also convenience must be considered if efficient service is secured from an equipment. In modern hospital construction laboratory facilities including *x*-ray equipment should no longer be relegated to rooms which are so entirely undesirable that they could hardly be used for anything else. Rather should these laboratories receive as much consideration as administrative offices or operating rooms.

The writer would urge simplicity of apparatus as a fundamental requisite. When tables and stands are over-elaborate, with strings, catches, springs, measuring scales, etc., in profusion, one of two things is sure to follow, either the operator's time, energy and attention are devoted to the manipulation of his complex outfit and the patient becomes of secondary consideration, or else the various attachments are ultimately ignored and his attention is put where it really belongs, *viz.*, on the case in hand. If less money and time were spent on mechanical and ornamental frills

and more on fundamentals and patients, the standing of the profession would be greatly improved.

Another feature should receive consideration when designing new installations and when possible in others. The apparatus visible to patients should be limited as far as it is possible to do so. Many patients are frightened and excited by the noise, sparks, etc. In heart and stomach cases this is no small matter. The only excuse for an elaborate display of cabinet, switches and trinkets is the vanity of the operator or owner. Ideal operation would hardly be perceptible to the patient.

Full measure of protection must be insisted on for both patients and operators or attendants. This should be a matter of test, not of conjecture. Not only must there be protection from rays passing out through the active hemisphere but also from parasitic rays. There is one very simple way in which to test the protection offered. A few pieces of suitable photographic paper fastened at various points and developed at intervals will give a good idea of the amount received. This method ought certainly to be used on the vertical fluoroscope, and to map out the region covered by the patient in treatment. The writer has seen cases where it would be extremely risky to give treatment with multiple ports of entry without much more complete protection outside the treated area than is usually given.

While appreciating the good intention of manufacturers and their staff in giving instruction and advice, it may well be questioned whether in the long run this is not an expensive and even an unfair method. The statement made in advertising literature that "the giving of this information entails no expense" is clearly misleading and untrue. This expense is charged in as "cost of doing business," "sales expense," "overhead," etc. It must be paid for by some one in some way. Is it good professional ethics to be under implied obligation to a commercial house? Does not physician or hospital really pay in the initial outlay for all the assistance and supervision whether it is needed or not? A competent operator is charged for the expense of instructing the incompetent. It is plainly the duty of medical colleges to furnish *adequate* information and training, and the profession has a right to demand that it be given without commercialism of any sort.

In the education of the public all should endeavor to correct some of the fantastic notions common among laymen. Many patients delay or even refuse an examination for fear of burns. Within a few months the writer has heard such statements as "x-rays dry up blood-vessels," "cause the flesh to slough off," "stop heart action," etc. Others have expressed surprise that no trace of inflammation followed an examination. The medical profession should first make sure that the work is in competent hands and then reassure their patients.



A frank and fair statement of the probable value of an examination in a doubtful case may be reasonably expected from the specialist in this field. The conscientious and capable roentgenologist must use every effort to give a proper point of view to physicians and surgeons. This may require considerable tact and forbearance on his part. Often very unreasonable demands are made even to expecting the impossible. When sending a patient as a last resort in some more or less obscure ailment, a definite diagnosis with 100 per cent. accuracy is expected where it is perfectly clear that other methods can lay claim to no such accuracy. Those who are over critical of the radiographic or fluoroscopic findings, would in many cases make a rather poor showing if their usual diagnoses were accurately tested.

Finally there is grave need of more systematic and broad investigations of the biological effect of all sorts of radiation than has as yet been possible.

In order that experience gained in one laboratory or hospital may be of service in others, it is absolutely necessary to train men to use a common language and standard measurements at least to such an extent that one may reproduce the radiation said to be beneficial. This cannot be done without careful attention to the physical factors involved. Thus a complete specification of an  $x$ -ray treatment involves the measurement and statement of the following quantities: (1) Target-skin distance; (2) time of exposure; (3) area of surface receiving the radiation; (4) the effective tube voltage; (5) the current through the tube. Only when we can be sure that these are properly stated can the treatment be duplicated. The same proposition holds true in regard to all physical methods of treatment. No doubt much valuable information has been secured in the effort to find specific cures for malignant growths, but it may be that progress would be sounder and more rapid if the problem were broadened and the great advances in physical and chemical measurement were applied to the human machine with as much care as has been used in their commercial applications. Surely there is no more important field for human endeavor, and none where one ought to expect the best effort of the ablest men, with freedom from professional jealousy, freedom from every suspicion of commercialism: the highest ideals of human service.

Some organized effort should be made to promote such investigation, jointly by pathologists, biochemists, biologists and physicists in order that all phases of the work may receive careful attention. Only by such co-ordination and by full and effective co-operation on the part of physicians in the practice of various specializations, can the relief of human suffering and the development of human efficiency be best realized.

## FRACTURES OF THE TRANSVERSE PROCESSES OF THE VERTEBRÆ.

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By F. J. COTTON, M. D., F. A. C. S., of Boston.

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Within a year a certain amount of loose literature has appeared concerning fractures of the transverse processes of the vertebræ. It does seem to me that we should refrain from diagnoses, or at least from prognoses and cures, and even from expert testimony until we have more facts.

A few months ago, there came to my attention a case of trauma (not included in this present series) in which the *x*-ray department had made a diagnosis of fracture of a transverse process. It was a process of the fifth lumbar vertebra, and on inspecting the *x*-ray, I was by no means sure that the obvious separation was a fracture at all; still less sure that it was a recent matter! When I came to examine the patient it was obvious that the perfectly genuine damage from his accident had been to the spinal muscles, two to three vertebræ above the lesion in the picture.

This seemed interesting and so was a recent paper presenting the apparent cure of tabes brought about by treating a double fracture of the transverse processes of the fifth lumbar.

I cannot cure tabes, by any method, and the plates published aroused my interest and my doubt as to the presence of fracture.

There is probably a vast literature on the occurrence of separate ossification centres in the transverse processes, but it has not been tapped by me.

I went to the list of cases listed as fractures of the transverse processes of the *x*-ray department. There were 22 such. In 10 I could see nothing I should call a demonstrated fracture. The others are herewith reproduced. Some of the cases seem to show real fractures, however important they may prove to be. One patient (not listed in the dozen here presented) has recently collected some thousands of dollars from a public service corporation, because she showed (in the *x*-ray picture) fractures of the transverse processes. She had them, but I think they were over-valued.

No case has yet come to my attention with apparent fracture of the transverse processes (who did not have a claim on anyone) in whom this fracture seemed to cause disability, beyond that ordinarily associated with contusion or sprain of the back. In the last case I saw (not in this series) the man had been advised that an operation would be necessary. He had some lameness and did have fracture of a couple of transverse processes in the mid-lumbar

region, but I very gravely doubt the necessity of operating. Judging by what I have seen so far, there must be many people walking about with separate transverse processes, and in many instances, probably, as a result of trauma, but there do not seem to be any data on which to base any idea of any permanent disability from this cause.

The present series is presented for what it is worth, with the remark that the subject certainly needs looking into.

CASE I.—Male, *æt.* thirty-nine. While at work, fell between car and platform, striking his back against a wall. On entrance complained of pain in the upper lumbar spine and inability to bend over because of pain. He showed tenderness in this region and muscle spasm. He was put up in a plaster jacket and discharged after a week in the hospital. The x-ray here shows unmistakable fracture of the transverse processes of the first, second, third and fourth lumbar vertebræ on the right side.

CASE II.—Male, *æt.* twenty-six; struck by an automobile; bruised about the hips; lumbar spine low down is sore and stiff and tender; no sign of fracture of the vertebral column as such; no paralysis or deformity. Treated with a plaster jacket; discharged after twelve days. In this case, again, there can be no question of the traumatic character of the damage.

CASE III.—Male; driver of milk wagon. Horse ran away; driver tried to jump but was caught by the wagon as it turned over. On admission to the hospital he showed, beside scattered abrasions, definite tenderness over the upper part of the sternum, and pain and soreness in the lumbar spine. Treated in plaster jacket; discharged to his own physician after eighteen days. Here again there is no doubt of the adequacy of the cause offered by the runaway to account for the lesion in the picture.

CASE IV.—Female, *æt.* thirty-two; entered the hospital as an acute alcoholic. She showed enough scattered contusions however to put her in the traumatic class. She was discharged as soon as she 'sobered up,' and it is not clear from the record why her back was x-rayed. At all events it was, and a lesion was evident, but a lesion that might be old or new; that had no definite relation to the events that brought her to the hospital. The tracing shows clearly a broken process on the fourth lumbar, but in fact the rather thin plate shows the fracture surfaces not clean and fresh, but thickened over; a bit the densest bone in just that region. Here then there is no serious question but that there has been a fracture; just a question of when.

CASE V.—Female of middle age; said to have fallen and hurt left ankle. This ankle was swollen and tender. X-ray showed it negative. X-ray taken of the back (on general principles, apparently) shows the two fractures here seen. There seem to have been no symptoms referable to the spinal condition, severe enough to get into the notes. She was an alcoholic, and after three days went home sober. There is no doubt in my mind that the plate herewith shown means fracture. The question is one of date! I believe we are going to find, when we get full data, that bony healing is not the rule in these cases; that symptoms may not be severe; that dates are hard to fix. In this case, like the last, there seems to have been smoothing-off of the fracture surfaces, hardly compatible with *fresh* injury.

CASE VI.—This case is presented as it lies; we could not identify it in the house records. That it represents results of trauma seems beyond question. There *seems* to have been smoothing over of fragments, hardly compatible with *recent* injury. The rather wide separation of fragments in this as in other cases, would *suggest* the probability of loose fibrous union without bony contact, without symptoms.



The cases so far cited *seem* to be traumatic, at least. In several, as noted, there seems to be a legitimate question as to the date of the trauma; a question whether we are not dealing with the results

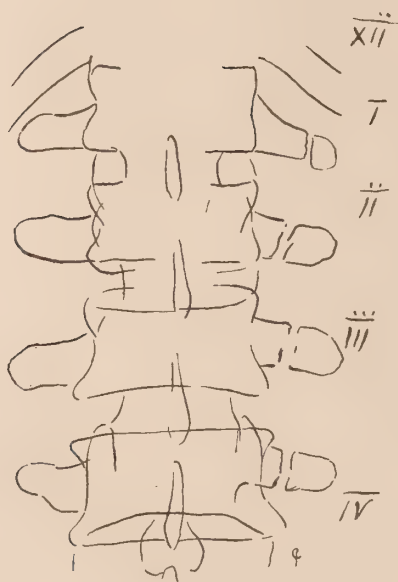


Fig. 1 (Case I).

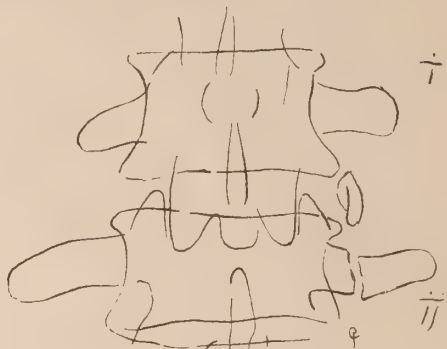


Fig. 2 (Case II).

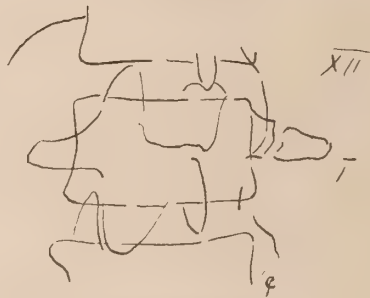


Fig. 3 (Case III).

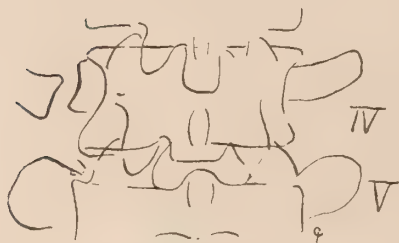


Fig. 4 (Case IV).



Fig. 5 (Case V).

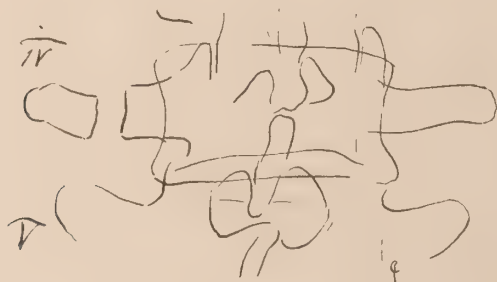


Fig. 6 (Case VI).

of previous accident, healed without, or essentially without, symptoms.

In the cases to follow, the traumatic origin of the lesion, at whatever date, is doubtful, at least.

CASE VII.—Male, *æt.* twenty-six; admitted for influenza, without history of accident; discharged after one week. He was listed as having sacroiliac



Fig. 7 (Case VII).



Fig. 10 (Case X).

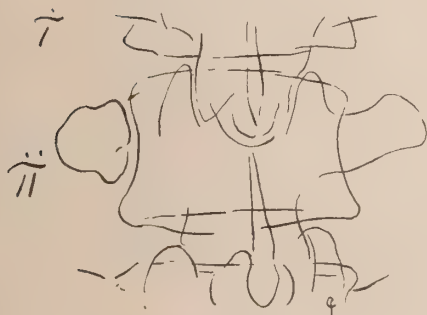


Fig. 8 (Case VIII).

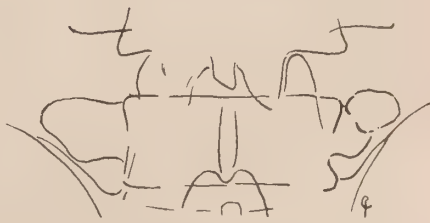


Fig. 11 (Case XI).

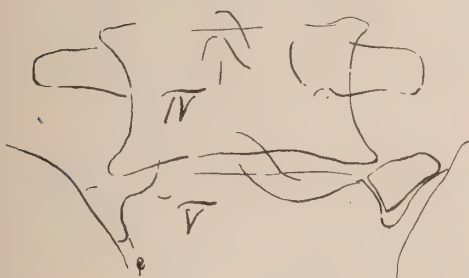


Fig. 9 (Case IX).

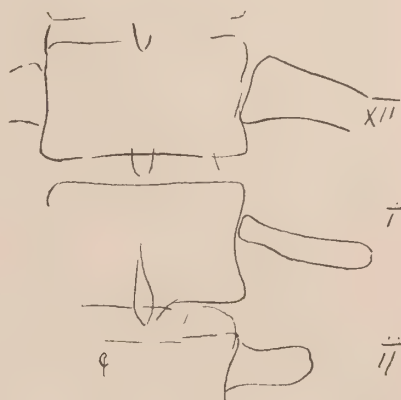


Fig. 12 (Case XII).

symptoms as a complication; no story of trauma, unless a fainting attack the day before might be so interpreted. The plate herewith presented shows a separated process of the first lumbar, which does not look like a fresh fracture. Whether it represents an old fracture, or a result of irregular ossification, I do not know.

CASE VIII.—Male, *æt.* forty; admitted with a history of having strained back in lifting. Diagnosis was made of burns and hemorrhage into the cord; the burns were due to applications prescribed by his doctor. He had extensive ulcerations of the left thigh. There were signs suggesting hematomyelia or myelitis, or hysteria, and no one during his stay in the hospital, or for

months afterward, during a period in which several others beside myself examined him, seems to have got at definite data. Personally I think the case hysteric rather than organic. The point, however, is that an *x*-ray taken on general principles, showed what was called a fracture, but it seems obvious that it was at least an old lesion; more probably an irregular ossification, rather than a traumatic result of either recent or previous data.

CASE IX.—Male, *æt.* forty-eight; admitted with diagnosis of hematoma of scrotum from a slight fall. *X*-ray, taken on general principles, shows a separation of the transverse process of the fifth lumbar with a definite, narrow, old looking, joint-like interval. There is absolutely nothing to suggest any connection between this lesion and the accident which gave him his scrotal hematoma. He was discharged with a suspensory, after ten days.

CASE X.—Male, *æt.* forty-five; about three weeks previous to admission, noted a swelling at the base of the spine which increased and grew painful. Entered the hospital with a fluctuating abscess just to the right of the sacrum; abscess opened and 8 oz. of foul pus evacuated. He remained in the hospital only two days. A routine *x*-ray showed separation of the transverse process of the fifth lumbar vertebra on one side. There was no history of trauma and nothing to suggest that this anomaly had anything to do with the abscess.

CASE XI.—Male, *æt.* twenty-two; had been through an accident of which he can give no account; listed as having a fracture of the skull, vertebral injuries and a broken ankle. As a matter of fact, the record shows no data that would justify the entrance diagnosis. He had a scalp wound and at least a sprained ankle. He was treated in a plaster jacket because the *x*-ray showed a separated transverse process in the lumbar region. This *x*-ray shows a nice, smooth, rounded-off false joint, with a rounded, nubbin-like distal fragment. I feel sure it has nothing to do with recent trauma; inclined to think the whole story dependent on development, not trauma. The patient remained in the hospital nearly six weeks; discharged in good condition.

CASE XII.—Male, *æt.* thirty-three; fell from a scaffolding; showed tenderness of right lumbar region and of ankle. There are two sets of notes; one calls the spine negative; one credits it with a fracture of a transverse process. The patient was discharged after eight days in adhesive strapping. The *x*-ray showed a nice picture of a first lumbar rib on both sides of the first lumbar body. During preparation of this paper, the plate was broken, but the accompanying Fig. 12, shows the condition on one side; both sides were substantially alike.

Now the net result of this sketchy investigation seems to be that anomalies in this region are frequent; often ill shown by average routine *x*-ray plates, and not always properly interpreted. Also that they are very apt to be called fractures.

More than that, it is suggested that real fractures of the transverse processes may not improbably unite by fibrous union without persistent symptoms, and be chanced on later.

There is no doubt that real fractures of transverse processes of vertebræ in the lumbar region occur; probably not very infrequently. How important they are does not yet appear, nor will it appear until other series of the sort here presented are studied out; and some of them carried out to investigation of end-results.



## POST-OPERATIVE X-RAY TREATMENT IN MALIGNANT GROWTHS. HAS IT ESTABLISHED ITS VALUE?

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By MYLES W. JOHNS, M. D., of Utica, N. Y.

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Some writer has said, "We report hundreds of cures but say nothing of thousands of failures." This is an unjust criticism of a new branch of treatment. While Roentgen discovered the ray only twenty-one years ago, medicine and surgery have been developing through the centuries. So let us look at this study as one that has been striving each day to become more the aid and great co-worker of the surgeon as well as the physician.

Many things we have learned; and when we see the rapid strides that roentgenology is making to-day, is it not a wonder that with such imperfect equipment as men have had in the past that even meager results were accomplished?

If you would criticize the earlier work, I trust that you will also consider the present day technique and follow closely the accurate means of dosage, the superiority and efficiency of the hard rays, the filtering and protection of skin surface. These and many other points greatly increase its value over that of even a few years ago.

Before taking up post-operative treatment, let us briefly consider its value, if any, in malignant conditions in general.

*Superficial Conditions.*—No one questions its efficiency. It is true many other methods have been successful, but the ray has certainly many cures to its credit.

Pusey, of Chicago, gives report of 44 cases of cancer of lip, 40 on lower and 4 on upper, ages from twenty-eight to ninety. He was able to report on these cases, all of which were investigated after a period of three years or over. He was able to follow up 38, and in all but 2 the treatments were successful. These being cases where glands beneath the jaw became involved, death resulted. He states at that time, this being some years ago, that after experience of eleven years in treatment of several hundred epitheliomata with *x-ray*, he felt more strongly convinced than ever that used with attention to technique and with proper regard to therapeutic indications, the *x-ray* is one of the most useful or the most useful single agent in the service of dermatology. *In the orifices of the body*, I have seen amazing results and wonderful cures even with the older methods of treatment. Carcinoma of the

orbit, and advanced cases of the nasal cavities to such an extent as to render them inoperable, I have seen completely cured.

Then the "God Awful Cases" as Mayo calls them. Who really sees them at their worst? The roentgenologist, for it is to him they are sent as a *dernier ressort*. One such case I saw last summer, a private patient of Dr. Clark's, of Philadelphia. The case, one of recurrent carcinoma of the breast, six months previous to this time had an area on the left breast as large as the palm of the hand. This tissue was rapidly breaking down, exuding considerable offensive discharge, and presenting numerous nodes on all sides. The other breast had an enlargement the size of a large hen's egg.

Under Dr. Clark's treatment, the large, sloughing area had completely healed, the nodules disappeared and the tumor in the opposite breast had shrunk at least to one-half its original size. This case seemed indeed remarkable as it was impossible to call surgery again as an aid, an indication of what the ray may do even in the advanced stages.

A recent report of Levin of 1,002 malignant cases gives 57 clinically cured and 51 cases improved to the state in which they become operable. 58 cases, which were in an operable stage, were treated by radiation alone,<sup>1</sup> giving clinical cure in 67/10 per cent. of a total of 979 inoperable cases, which is far superior to any therapeutic measure ever presented. He also reports a case of sarcoma of the sigmoid. After exploratory operation the case revealed a large tumor mass with multiple nodes disseminated throughout the peritoneum. It was declared inoperable, and large doses of ray were given for six months up to the time of his death.

Autopsy revealed the peritoneal tumors either completely destroyed, often replaced by dense connective-tissue, or so surrounded by connective-tissue that the growth was greatly inhibited.

The original tumor had not increased in size. Still with all the intense raying under proper technique and with so much destruction and retardation of malignancy there was produced no injury to the cells of the skin or peritoneum. In this case had the main mass been removed, it would seem that recurrence might have been prevented or delayed for a long time.

Let us briefly consider the action of the ray upon cell life and tissues in general. This action depends upon the quality and quantity of the rays. The *soft rays* are not penetrating, for they seem to produce very little effect outside irritation of the superficial tissues, while the *hard rays* (those of short wave length) have much greater penetrability and produce definite changes in cell structure. Small amounts of these rays may stimulate cell growth, larger inhibit, and still greater, destroy the life of the cell. These changes are mainly evident in the nuclei, through the action of ray inhibiting proliferation and later destroying cellular activity.

Glandular epithelium and the lymphatics are especially susceptible to the action of the ray, as are also newly formed and embryonic tissues. The ray also acts on the blood-vessels, destroying first the cells of the intima (endothelial cells), leading to retraction and later obliteration of the lumen with the resultant effect upon tissues supplied by these vessels.

Hence we can draw the following conclusions: (1) The *x*-ray acts with greater selective action upon newly-formed malignant tissue with its rapidly forming and developing cells and blood-vessels; (2) it is also less active upon the older cells of the growth which have persisted for some time and become firmly established; (3) surgical removal of the main cancer mass, if possible, followed by thorough raying of the more recent cancer cells and lymphatics, would produce definite results in the shortest space of time.

Illustrating this let me report 3 cases.<sup>2</sup>

CASE I.—Carcinoma of cervix having inadequate treatment. Effect of the rays not uniform. Some areas were unchanged and others showed destructive action. At border-line of tumor mass, areas where the cells were stimulated, were found.

CASE II.—Advanced pavement carcinoma of cervix. Under more thorough raying than first. Examination of removed tumor showed some small nests remaining, but great majority of malignant cells, both superficial and deep, were undergoing destructive changes.

CASE III.—Typical adenocarcinoma of cervix with ulceration of os. Case was curetted and cauterized. Then treated by radium and roentgen ray. Not being completely satisfied with effect, thinking cure not complete, for a small ulcer persisted, patient was operated on and death resulted six days later. In this case a histological examination revealed a cure, for not a vestige of malignancy could be found, showing that by combined surgery and radiotherapy we are able under improved technique to produce not only clinical but absolute cures.

If surgery really cures these malignant cases, then I can see very little need for this paper. But are the surgeons of to-day satisfied with their work?

One of the leading surgeons in the Middle West stated a short time ago: "I have often said that I should like to shift all my cancer cases to somebody toward whom I have a grudge."<sup>3</sup>

In the review of surgery of the breast, there has been and is constantly being brought forth surgical procedure to attempt to accomplish more satisfactory results. Jackson states that in operated and unoperated cases at least 75 per cent. of all women with cancers of the breast die of the disease.<sup>4</sup>

In discussing the Wertheim operation in carcinoma of the uterus and adenexa where lymphatics are involved, Dr. Farrar Cobb of the Massachusetts General Hospital states that he considers 50 per cent. coming too late for curative operation, while that of those operated on, 50 per cent. are cured with operative mortality of 9 to 30 per cent.



I might go on at length, but you all know and feel that we should still perfect our technique so that better results if possible can be accomplished.

It is not a modern idea that the ray alone should cure these advanced cases. Good judgment tells that the growth should first be surgically removed, but, as you all know, there is a limit to the removal of tissue. Should too much lymphatic tissue be taken out we are diminishing body resistance, lowering the barrier to the disease, and decreasing chances of ultimate recovery.

To attempt to treat these larger growths with metastasis by the ray alone is not practicable, for not only are we taking considerable time in destroying the original tumor, but the destruction of such large masses of cancer cells has a very serious effect upon the patient, due to the absorption of the products from the large number of killed cancer cells.

Wassermann has already called attention to this in the destroyed tumors of mice. He has shown that if the destroyed tumor was the size of a hazel-nut, the animal died of intoxication from the lytic cancer cells.

Admitting then the efficacy of the rays in such cases as previously mentioned, it would then seem that to procure the best results we must necessarily combine the two methods, provided only that we can produce rays which reach the deeper tissues and produce there the same action as on the more superficial growths. It is in the lymphatics that we must continue the struggle to exterminate the last trace of malignancy.

Past efforts in post-operative treatment have given us decided results.

Bythell and Barclay<sup>6</sup> as early as 1912 speak of this method as of the greatest value in preventing recurrence of the growth, stating "we have treated a large number of patients in this way and have so far known only one growth to recur. In this case, one of great virulence, several nodules made their appearance soon after the treatment was commenced—probably before the rays had time to take effect—but disappeared entirely after further heavy dosage.

Rodman<sup>7</sup> gives his report of 50 private patients operated consecutively (excluding three cases of acute carcinomatosis all of which were quickly fatal and which he now believes inoperable) 36 (72 per cent.) are well three years or more after operation. In all cases of average severity, operated on since 1909, the x-ray has been employed, and in several advanced cases he states that he is inclined to give at least part of the credit to roentgen ray treatment subsequent to operation.

Murphy,<sup>8</sup> in answer to the question of post-operative treatment,

says that he uses post-operative raying to destroy any cells that have escaped our operative dragnet. It is fairly well established that often malignant cells, both sarcomatous and carcinomatous, are isolated in loco by connective-tissue encapsulation. He considers the ray a stimulant to connective-tissue reproduction.

Percy, of Galesburg, Ill., the great advocate of the Cold Iron Method of treating malignancy, lays great stress upon the roentgen treatment following the destruction by his method of main malignant mass. He states: "The roentgen ray has played an important part in the local treatment of cancer and it is probably that it is destined to play a greater rôle if the work of Baum, of Berlin, of Kroenig and Gauss, of Freiburg, holds up its early promise. That the roentgen ray will inhibit and destroy the carcinomatous cell (or germ) under favorable conditions there can be no reasonable doubt.

There remains for the physicist only the problem of making the rays reach in an effective way the most inaccessible regions of the body, the habitat of cancer."

As if in fulfillment of the above requirements, by the advent of the Coolidge tube we are now able to reach with the hard effectual rays these inaccessible regions, and by the cross-fire method give them the same dosage that we gave to produce such favorable results on surface growth, and this without injury to overlying tissues.

This tube is similar in appearance to a 7-inch tube—its vacuum is 1,000 times greater than the ordinary tubes in present use. Its anode is of solid block tungsten supported on a rod of molybdenum and the cathode contains a spiral of tungsten. It is only by heating this cathode that a current can be passed through the tube. Without heating, the voltage may be increased even to 100,000 volts, yet with no current passing through or any ray produced.

When heat is applied to the filament, however, the electrons escape and these are driven off as fast as produced, causing a bombardment at the anode, thereby producing the ray. In this type of tube, by maintaining the filament at a certain degree of temperature with a definite resistance, (voltage) the results are always constant.

In this manner if we wish the hard rays, we heat the cathode to the required degree, and by increasing the voltage to a maximum the tube will continue to give the same degree of hard rays for hours of constant use, an impossibility with the ordinary tube. This tube has really revolutionized the entire x-ray field.

With the aid of proper filters to eliminate the superficial (soft) and medium rays, the cross-fire method, so that we can give efficient dosage to the deeper tissues and a tube of this type where hard

rays are produced in abundance,—who can say what the future possibilities may be?

It is true that there are many reports of results by this method, but as we must consider the time element during which the growth has failed to reappear, we must wait for definite conclusions. In the meantime, let us see that our patients are given the most effective modern treatment, both surgical and roentgenological, with the present technique, for it is far superior to the older methods, and the fact that post-operative radiation is adopted as routine method treatment by such leaders in the surgical field as Kelly, Murphy, Rodman, the Mayos, Bumm, Crile and many others, certainly carries with it the approval of the master minds of our profession.

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Evans Building.



## ONE HUNDRED AND THIRTY-NINE CASES OF SKIN CANCER CURED BY X-RAYS.

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By EMIL H. GRUBBE, B. S., M. D., of Chicago.

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The use of *x*-rays in the treatment of skin cancer dates back to 1896, when Dr. John E. Gilman, of Chicago, first suggested that this newly discovered agent might offer possibilities in the treatment of malignant conditions.

Even at that early date, with most imperfect and comparatively inefficient apparatus, almost magical results were obtained in a number of cases. It was but natural that these striking results should create enthusiasts whose language pertaining to the value of this treatment appeared to know no bounds. However, I need hardly state that even the wildest dreams of the pioneers have been realized, for the *x*-ray has gradually extended its sphere of usefulness until, at the present time, it occupies a unique position in therapeutics. Some therapeutic agents come, are used for a short time and then are laid aside for other more patent measures, but the *x*-ray has, during a period of nearly twenty years, become more and more useful as its peculiar properties have been studied, and to-day it ranks as the remedy of choice in quite a list of pathological conditions. X-ray therapy then is no longer in the experimental stage. The vast amount of literature bearing upon this subject is an appreciation of its importance.

It is a matter of history that I took a conspicuous part in the birth and development of *x*-ray therapy, and as I have been intimately connected with this phase of work ever since, I feel that I have had exceptional opportunities for observation and experience.

In previous papers dealing with this subject I have discussed the value of *x*-ray treatment as an adjunct to other treatment. In this paper, although I have had under observation nearly 500 cases of skin and mucous membrane cancer, I shall confine myself to the consideration of 155 cases of this disease under *x*-ray treatment, *exclusively*.

In order that a fair estimate of a remedy may be formed, selected cases only should be treated.

In skin cancer selected or ideal cases are not those in which metastases are present. I am of the opinion that when cancer involves the glandular system, then the case is not curable by any method of treatment known to-day, surgery not excepted. In epitheliomata of mucous surfaces the depth of tissue involved deter-

mines whether the case is ideal for *x*-ray treatment or not. So long as the mucous membrane alone is affected *x*-rays will produce good results, but, if the disease has extended to the submucous structures, then the case is not an ideal one for this treatment.

Carcinoma of the skin probably never occurs as a primary lesion but is secondary and due to migration of cancer cells from some other part of the body to the epidermis. This particular form of cancer, therefore, is not very amenable to *x*-ray treatment or any other treatment; consequently I do not classify such cases as ideal for this method.

Whether the case be ideal or not, doubt need seldom be expressed concerning the diagnosis of skin cancer. Most cases come to us in the ulcerated stage. With cocaine and the curette we can readily remove enough material so that a microscopical examination is possible. However, a word of caution should be given here to the effect that extensive curettage is a dangerous procedure because it opens up channels for the spread of cancer cells. The curette should therefore not be used too extensively.

Practically all the cases reported in this paper have been microscoped by competent laboratories. I have done this not so much to be able to controvert those who are loath to acknowledge the correctness of the diagnosis when cancer has disappeared and remained absent for some time following *x*-ray treatment, but to convince myself of the possibilities and limitations of this treatment; in other words, to establish its true position in electro therapeutics.

The action of *x*-rays on cancer tissue has been studied by a large number of investigators, and the consensus of opinion is that heroic cumulative effects of *x*-rays produce primarily a gradual atrophy of the cancer cells and later a granular degeneration and absorption of these cells. At the same time a proportionate stimulation of connective-tissue cell formation is noticed. These new connective-tissue cells ultimately occupy the place left vacant by the destroyed cancer cells.

"Practice makes perfect." This is particularly true of the application of *x*-rays in skin cancer. In the early days we gave comparatively small doses of the rays and produced proportionately small results. Now we give larger doses and get in return much better and quicker results. Like all other therapeutic agents the *x*-ray possesses dual action. Weak doses produce physiologic effects, while large doses produce toxic effects.

In the treatment of skin cancer too small doses of *x*-rays are harmful because they stimulate the cancerous growth to greater activity. This fact should be kept constantly before us. Half-way measures should not be used when heroic measures are in order. The treatment of epithelial cancers should be essentially destructive,

and for that reason massive applications of the rays should always be given.

There is no doubt in my mind that the more vigorous the treatment the more favorable will be the prognosis. Therefore, all cancers should be treated with the least possible delay. The massive dose or the 'intensive method of treatment' gains time more than anything else and should appeal to us for that reason particularly, but it also produces the same decided distinctive effects in the cancer cells which would be produced by the slower technique.

To make sure that all active cancer cells will be destroyed I always expose a small area of healthy tissue just outside the limits of the cancer lesion, to the action of the *x*-ray. If any cancer cells have extended out into this apparently healthy region they will be destroyed at the same time that the major malignant tissue is affected. In treating thus there is little likelihood of a recurrence. Such application of the *x*-ray is analogous to the wide excision or dissection practised by the surgeon when the knife is used in treating cancer.

I maintain that it is essential to produce a decided inflammatory reaction or dermatitis in these cases in order to secure the best effects. The usual reaction is ushered in with a pronounced erythema, then come swelling, tanning, itching, erosion and finally considerable soreness. I consider a fairly severe reaction desirable because more permanent results can be expected therefrom. A mild reaction may result in healing over the ulcer, but a recurrence of the cancer is very apt to take place. If the newly formed scar tissue be weak and slow in becoming hardened, it is an indication that more vigorous *x*-ray treatment must be resorted to in order to clear up the case.

I have been able to cure cases of skin cancer with high vacuum as well as low vacuum tubes, but since it is not advisable unnecessarily to affect healthy tissues beneath the lesion, and since practically no penetration of the ray in these cases is required, I prefer a low or soft tube; as a rule a 1-3-inch air resisting vacuum is best. If the high vacuum tube is used, an aluminum screen at least one millimeter in thickness should be placed between the lesion and the *x*-ray tube. Ordinarily much more rapid cumulative effects can be obtained with the unfiltered rays because the alpha and beta rays which are then active on the lesion produce cumulative effects in one-eighth the time required for filtered gamma rays.

The advent of the Coolidge tube has made it possible to control *x*-rays absolutely. But even though it has simplified *x*-ray therapy considerably I do not consider this tube essential in treating skin cancers. Although I have often cured cases of skin cancer with a single massive dose, I do not wish to convey the idea that in-



tensive *x*-ray treatment necessarily means treatment with a Coolidge tube, neither does it mean one single application with an ordinary tube. Under certain circumstances the dose may be given in divided amounts, *i. e.*, at several sittings. Now, more than in the past the use of *x*-rays therapeutically requires discrimination, skill and judgment, which makes it almost impossible for the tyro who is usually superficial and a hopeless routinist to dabble with successfully.

The total number of uncomplicated skin cancers which I have treated with *x*-rays *exclusively* is 155.

In order that my results may be compared with other treatments, I append a table showing the time following discharge of the patient during which no recurrence has appeared.

2	have remained free from recurrence fourteen years.
2	have remained free from recurrence fifteen years.
3	have remained free from recurrence twelve years.
2	have remained free from recurrence eleven years.
3	have remained free from recurrence ten years.
4	have remained free from recurrence nine years.
3	have remained free from recurrence eight years.
6	have remained free from recurrence seven years.
8	have remained free from recurrence six years.
14	have remained free from recurrence five years.
20	have remained free from recurrence four years.
20	have remained free from recurrence three years.
25	have remained free from recurrence two years.
27	have remained free from recurrence one year.

A total of 139 cases have remained free from recurrence for more than one year.

In some of the remaining 16 cases I have not been able to get a subsequent history; some have died from intercurrent disease or accident.

Sufficient time has elapsed in a large enough number of the cases to enable us to draw conclusions as to the ultimate results obtained. Omitting those cases which have not yet remained well more than three years, the balance of my list makes a very good showing and proves this treatment well adapted to skin cancer.

If we consider, for the sake of argument, that the 16 cases which are not accounted for are failures, we still have over 90 per cent. of the total number of cases treated to classify as clinically cured. I am convinced that with better technique and conservative selection of cases even a much larger percentage of cures can be produced.

As more direct evidence of the efficiency of exclusive *x*-ray treatment in skin cancer I will add the abridged histories of just a few typical cases.

CASE I.—Mr. J. H., *æt.* forty-five, sent by Dr. W. J. Truitt. This was a case of ulcerative or basal-celled epithelioma of the right cheek on line with the mouth, area of ulcer the size of a five cent piece. Received altogether 15 divided dose treatments. Patient was discharged symptomatically cured September 30th, 1906, and has remained free from recurrence.

CASE II.—Mrs. J. B. C., *æt.* thirty-five, sent by Dr. J. E. Gilman. Diagnosis Paget's disease of the left breast. This case was treated in the early period of *x*-ray work and therefore received a large number of treatments before a cumulative effect was produced. Following this the lesion healed and remained well about one year, when it recurred. However, the patient was not discouraged and concluded that the remedy which once controlled the situation would prove effective again. Accordingly she returned for another series of treatments, and the ulcer was again healed and has remained so since April, 1906.

CASE III.—Mr. J. B., *æt.* sixty, sent by Dr. G. M. Hill. This was a case of granulomatous type of epithelioma on the lower lip, a so-called smoker's cancer. The patient received 10 full dose treatments when a decided reaction occurred. Following subsidence of *x*-ray irritation the ulcer healed and has remained well nine years.

CASE IV.—Mrs. L. J. K., *æt.* forty, sent by Dr. Leroy Thompson. Diagnosis round-celled sarcoma on right side of nose near region of tearduct. This case was operated surgically and although a wide, clean excision was made the disease reappeared immediately and was growing rapidly when the patient was sent to me for *x*-ray treatment. Although the prognosis was not favorable, yet with heroic doses of the *x*-ray the value of this treatment was most strikingly demonstrated, for she was cured and is perfectly well to-day.

CASE V.—Mr. A. T., *æt.* sixty-five, sent by Dr. M. C. Bragdon, diagnosis nodular type of epithelioma on back of right hand, lesion the size of a quarter. This case was treated by the divided dose technique and consequently required 21 separate applications before a cure resulted.

CASE VI.—Mr. M. H. McG., *æt.* sixty, sent by Dr. F. McNamara, diagnosed as squamous celled type of epithelioma involving the middle of the lower lip. Ulcer the size of a dime. Received 5 heroic doses of the *x*-ray. Eventually, after the reaction subsided, the parts healed beautifully and hardly any scar is now visible.

CASE VII.—Mrs. M. K., *æt.* forty, sent by Dr. J. Delprat, diagnosis semi-fibroid type of epithelioma involving whole of upper lip and lower one-half of the nose with extensive destruction of the septum. This case had previously been treated with arsenic paste, followed by surgical excision but without benefit. Previous to her visit to me she had also received several *x*-ray applications at the hands of another operator, but undoubtedly they were too mild for no reaction had occurred. After I gave her 6 massive doses of *x*-rays, such decided sloughing of the ulcerated area was produced that it became completely enucleated. The wound healed perfectly and there has been no recurrence in more than six years.

This case is mentioned to impress the importance of pushing *x*-ray treatment when once begun until a cumulative effect is produced. The line between success and failure is so fine that we are often right on the line but do not know it. If the operator had pushed his treatment a little more or impressed the patient with more confidence in his ability to produce results if the treatments were continued, undoubtedly success would have been achieved.

earlier. Success, therefore, depends not only upon selection of the proper remedy but also upon the proper manipulation of that remedy.

I believe we are justified in saying that those who are clinically or symptomatically cured by *x*-ray treatment are less likely to have a recurrence than those who have received other treatment. If to this we add the fact that *x*-ray treatment is a bloodless treatment; that no blood-vessels are opened up for the possible spread of cancer cells to other parts of the body; that it is a simple, safe, painless, non-confining and non-disfiguring treatment, then surely the burden should be upon the other methods to show cause why *x*-rays should not be used in every case of uncomplicated skin cancer.



## A MECHANICAL TRACTION DEVICE FOR THE REDUCTION OF FRACTURES OF THE FOREARM, WITH THE AID OF THE FLUOROSCOPE.

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Memphis.

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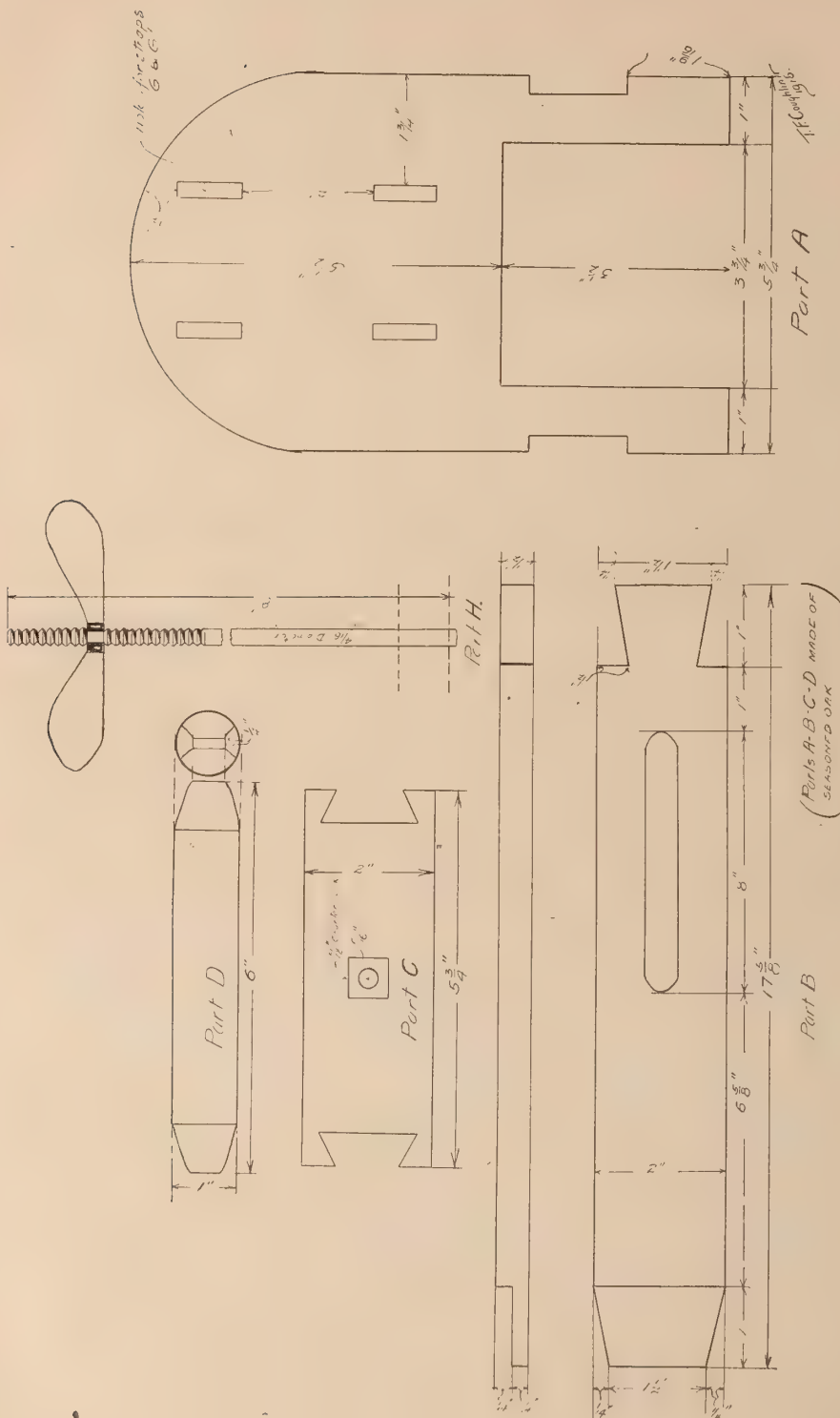
Several very excellent and satisfactory devices are in use for producing and maintaining powerful traction in reduction of fractures of the bones of the leg, but so far, to my knowledge, nothing has been offered which can be adjusted to the forearm to produce that steady, powerful, and controllable pull which is so essential in the proper reduction of an overlapping fracture.

The accompanying illustrations almost completely explain the device, and only a few words are necessary as to the method of application.

The upright D, about 1 inch in diameter, is placed in the palm of the hand. The screw H (flattened at this point) is passed out between the ring and the middle finger. The fingers are flexed over D, thus closing the fist tight. A 2-inch gauze bandage is now applied tightly and snugly over the closed hand, to prevent the opening of the flexed fingers when the pull comes. The strain in this way falls upon that part of the hand best fitted by nature to sustain it. Next the part A is adjusted to the arm, over the biceps, with ample padding at the bend of the elbow, and held securely in place by the straps G and G', passing over the tin splint E fitted to the back of the arm. The forearm flexed at right angles to A passes through the cutout part of A. The parts B and B' are placed parallel to the forearm and fitted into the dove-tail grooves in A at 1 and 1'. The ends of D fit loosely into the slots 2 and 2' of B and B'. The winged nut F is removed from H, and H then passed through a central opening in the part C. C is fitted by dovetail to the ends of B and B' at 3 and 3'. F is then screwed onto the projecting end of H and the traction begins.

The device when not in use is 'knocked down,' but when properly fitted to the arm and the screw tightened, every joint tightens up and the whole is most rigid and secure.

The parts C and D are about seven and one-half inches long and the part A is seven and one-half inches wide. This gives ample space between B and B' for the manipulating fingers to aid in adjusting the bones while traction is maintained, and fluoroscopic



*Lawrence: Mechanical Traction Device*

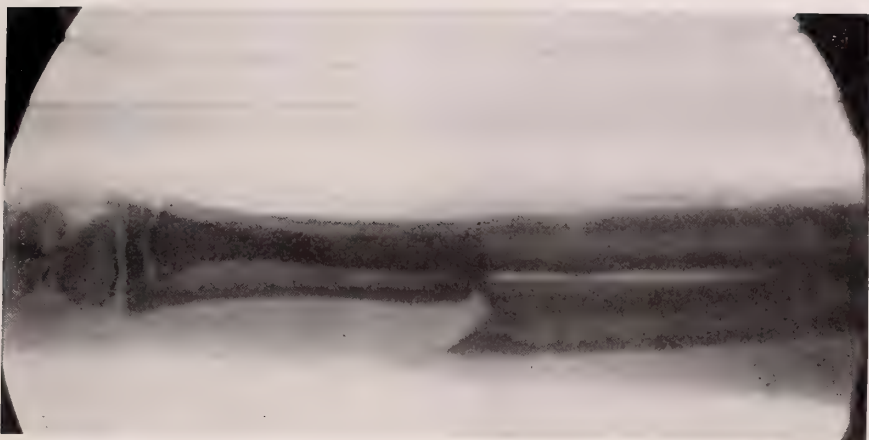


Fig. 1.—Before reduction.

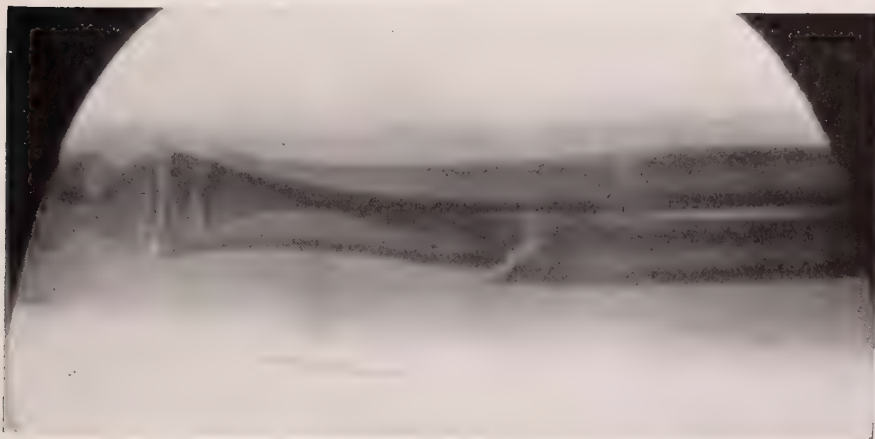


Fig. 2.—After reduction.

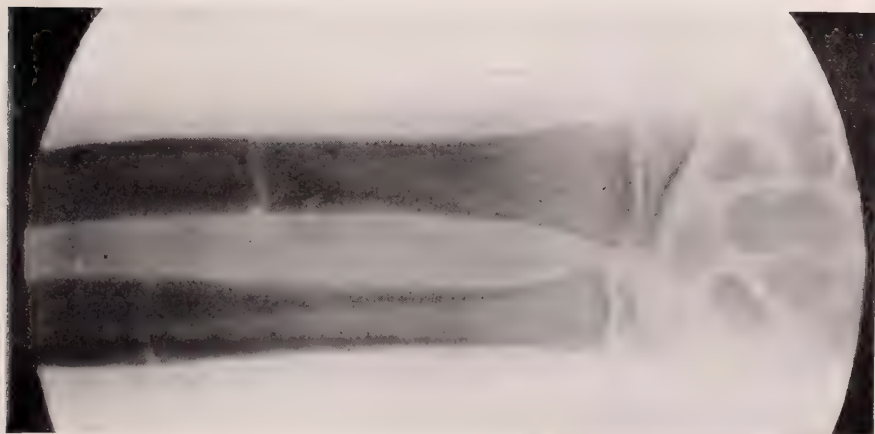


Fig. 3.—After reduction.



*Lawrence: Mechanical Traction Device*

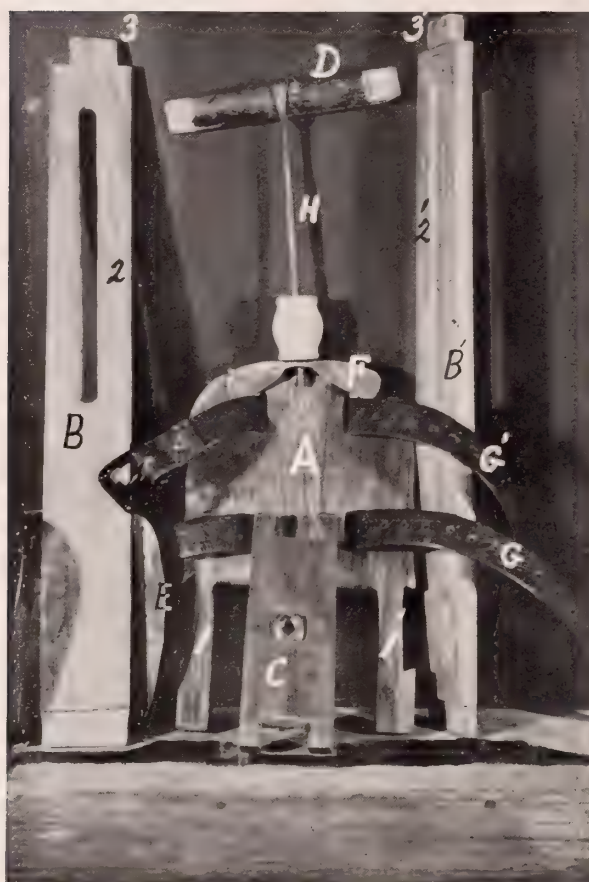


Fig. 4.—Device “knocked down.”

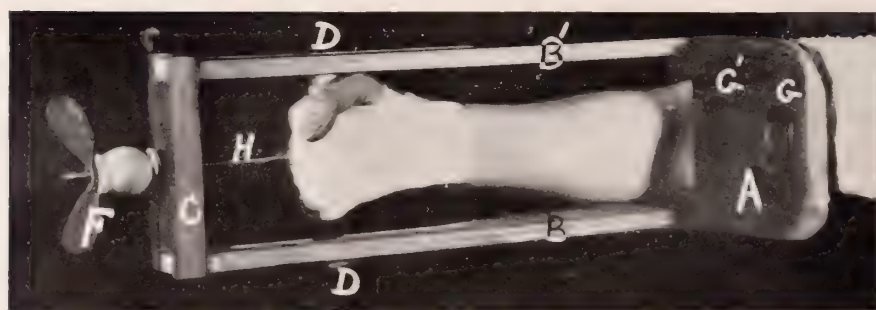


Fig. 5.—Device adjusted to the arm.

examination carried out. Since the arm is freely movable at the shoulder and held by this device perfecting rigid from the elbow to the wrist, either lateral or antero-posterior fluoroscopic view can be had, without change of the *x*-ray apparatus.

The parts B and B' are constructed of wood, sufficiently inflexible, but not dense enough to interfere with fluoroscopic or radiographic work. The space between these two parts makes it possible to apply a light dressing of splints and adhesive plaster to the arm, before traction is released.

After relaxing the tension a final observation is made with the fluoroscope, and if satisfactory it is checked up by plates, lateral and antero-posterior, either before or after the reduction apparatus is removed from the forearm. The light dressing is re-enforced by a long right angled splint.

The device is reversible and can be adjusted to either right or left arm. The screw H and the slots 2 and 2' in B and B' are made sufficiently long to be adjustable for patients of widely different ages.

The plates presented herewith are of a case treated as outlined above. While this case was an ideal one for this method, it was not one that was easy to reduce by ordinary methods. Two attempts at reduction, one with an anesthetic and ordinary manipulation, and the other with an anesthetic and fluoroscopic aid, had been carried out when the plate marked "before reduction" was made. The plates marked "after reduction" were made following the removal of the traction device and the application of a long splint to re-enforce the temporary dressing.

This device is not suitable for every fracture of the forearm, but in certain cases, an otherwise irreducible fracture is rendered reducible by its use. Now that the tendency of surgery is rather away from the open operation, it is hoped that this device will prove of service in lessening the percentage of fractures of the forearm in which the open operation is necessary.

Bank of Commerce Building.

## THE AMERICAN ROENTGEN RAY SOCIETY—SEVENTEENTH ANNUAL MEETING.

The seventeenth annual meeting of the American Roentgen Ray Society was held at the Congress Hotel, Chicago, September 27th-30th, 1916, under the presidency of Dr. A. W. Crane, of Kalamazoo, Mich.

The local committee of arrangements, Dr. Hollis E. Potter, Chairman, Dr. Adolf Hartung and Dr. Fred P. Zapffe provided splendid accommodations for the scientific sessions in the Florentine Room with a good lantern constantly at the disposal of the essayist. The scientific exhibit and the manufacturers' displays were probably more agreeable than ever before. Both these exhibits were in the large Elizabethan Room on the ground floor of the hotel, with the scientific exhibits occupying the center of this large room and the manufacturers' exhibits occupying the entire wall space.

Among the most interesting scientific exhibits may be mentioned that of Dr. D. B. Phemister, of Chicago, who had a "Gross and Macroscopic Pathological Exhibit of Bone Tumors, Osteomyelitis, Chronic Arthritis and Tuberculosis of the Joints." This was a beautiful pathological display which was worthy of a much better roentgenologic reproduction. Dr. H. K. Dunham, of Cincinnati, and Professor William Snow Miller, of Madison, Wis., had a combined exhibit of anatomical and pathological charts, wax models, photographs and specimens to demonstrate the normal lung and pathological changes produced by tuberculosis. One of the most exquisite exhibits was a combined injection of the bronchial tree, the arteries and veins of the lungs in three colors.

Probably the most artistic exhibit was that of Dr. Percy Brown, of Boston, upon "Pyloric Stenosis in Infancy." The radiographic reductions were tinted green and mounted in a very pleasing manner. Dr. James T. Case, of Battle Creek, Mich., had beautiful transparencies illustrating (a) antiperistalsis after ileocolostomy; (b) certain gynecological conditions (anencephaly, calcified fibroids); (c) lymphosarcoma of gastro-intestinal tract; (d) case of giant calculus. The diagnosis of anencephaly in this case had been made upon the negative taken of the fetus in utero.

The exhibits of Dr. Gladys Carr upon pathological conditions of the sella turcica and skull, which offered demonstrable roentgen shadows, was worthy of careful study. The exhibit of Dr. L. T. LeWald, of New York, was quite extensive and instructive; it included innumerable reproductions of syphilis of the stomach, pyloric stenosis of infancy, cardiospasm, water-trap stomach, transposition of viscera, non-rotation of colon, ureteral kinks, cervical ribs, Paget's disease and bone cysts. Dr. LeWald's method of labeling the roentgen shadows and the uniform excellence of his radiographs is always pleasing.

In all there were 32 scientific exhibits, each one of which presented evidence of roentgen values. We regret that limitations of space do not give us the opportunity of discussing the merits of each.

The manufacturers' exhibits were well arranged with that of the



General Electric Company's displaying the greatest amount of preparation. The exhibit of the Eastman Kodak Company displayed roentgen negatives in a most artistic manner. All of the well-known manufacturers of x-ray tubes and apparatus were represented.

The scientific program was unusually full and necessitated scientific sessions in the morning, afternoon and evening of the first three days of the meeting. There was entirely too much upon the scientific program, and the result was there was not enough time for the members and guests to pay the attention to the scientific exhibit and manufacturers' display. There should be more opportunity for the members to meet socially during these annual sessions.

On Wednesday morning H. W. Dachtler, of Toledo, read a paper on "Roentgen Therapy: A Report of 600 Cases of Skin Lesions Involving the Face." Dr. Albert Soiland, of Los Angeles, read on the "Roentgen Therapy of Skin Malignancy," showing the result of his work with fractional dosage. He does not use a massive dose for any lesion of the skin. Dr. Paul Eisen, of Chicago, reported on the "Roentgen Ray Treatment of Tuberculous Peritonitis." He showed a number of interesting results, but the trend of the discussion seemed to indicate that this method of treatment was still *sub judice*. There were also papers by Dr. W. S. Newcomet, of Philadelphia, on the "Treatment of Nevi by Radium and the X-Ray," and a further report by Dr. Henry K. Pancoast, of Philadelphia, on the "Treatment of Leukemia."

On Wednesday afternoon Dr. Roland Hammond, of Providence, discussed the "Roentgen Appearances of Osteomyelitis," showing many lantern slides of typical but instructive cases, all of which indicated the values of conservative treatment. The life history of many cases of osteomyelitis was shown.

Dr. Percy Brown, of Boston, read a paper on the "Broader Relation of Roentgenology in the Systemic Disorders Dependent Upon Local Sources." He lamented the maelstrom of diverse opinion entertained by the internist, the dentist and the roentgenologist, and entered a mild protest against considering the tooth root as the root of all evil, as there seemed to be a tendency to underrate other sources of focal infection. There must be co-operation to avoid pitfalls harmful to the patient from the circumscribed and concealed mischief about the teeth. Dr. Brown commented at length upon the structural defects about the teeth which are present in cases of congenital vicerotosis; both these conditions only being manifestations of an asthenic or adynamic habitus.

Dr. George E. Pfahler, of Philadelphia, read a paper on "Roentgen Diagnosis of Metastatic Carcinoma of Bone," and referred to the studies of Rumpel and Frankel. Dr. Pfahler divided the carcinomatous invasion of bones into two classes: The osteoclastic and osteoplastic. The osteoclastic process may be extensive or local, and results in the destruction of spots in the bone substance, which may appear irregular or worm-eaten; the condition leads to compression or a decrease in the height of the body of the vertebra. The bodies of the vertebræ gradually increase in size from above downward, and when there is any asymmetry in this gradual increase, we have an indication of pathology. The osteoplastic or osteosclerotic type of spinal carcinoma is not especially destructive and is frequently found as a metastatic display in car-

cinoma. Differential diagnosis does not depend upon the  $x$ -ray alone, but frequently a primary carcinoma may remain unobserved until the roentgen negative shows typical metastatic carcinoma. Metastatic carcinoma is usually the growth of carcinoma cells in the marrow, with a localized absorption or a localized sclerosis. An osteo-arthritis of the spine is not usually confined to one vertebra, and usually begins in a joint space. The edges of the vertebra are increased in sharpness and with lipping which may bridge over between the vertebræ; there are also other joints in the body involved. Carcinoma is essentially a disease of the bodies and transverse processes, and not of the joints. In primary tumors of the column, such as sarcoma, we find distortion and loss of contour with an increase of density and an involvement of the soft tissues about the spine. Dr. Pfahler says that wherever carcinoma is present and the patient displays rheumatic pains, these pains usually may be traced to metastatic involvement. Rheumatic pains should always force a consideration of metastases; this sign is much more frequent than generally supposed, there being usually 20 per cent. involvement of the spine in mammary or prostatic carcinoma. Carcinoma of the cervical spine is frequently a metastasis from the thyroid. Dr. Pfahler showed a healing process in carcinoma of the spine and of the ribs after persistent and vigorous roentgen therapy.

Dr. Preston M. Hickey, of Detroit, reported on the "Lateral Roentgenology of the Spine, Its Technique and Importance." The technique required a tube of unusual penetration which was now possible through the invention of the Coolidge tube, and the usual distortions of lateral negatives of the spine were eliminated if one used the long tubular diaphragm, with a tube distance of more than 30 inches and an extension diaphragm and a long compression cylinder coming in contact with the patient. If one obtains immobility of the patient, it is not necessary to make the exposure continuous. Dr. Hickey showed that many inconspicuous antero-posterior views gave most conspicuous pathology of the lateral views; many excellent lateral views of the spine were shown.

Dr. E. G. Blaine, of Chicago, read a paper on "Renal and Ureteral Stone Symptoms in Spondylitis Deformans." In a series of 59 cases where the clinical symptoms were more or less characteristic of stones, no shadows indicating renal or ureteral stone were found upon good  $x$ -ray negatives. Dr. Blaine found a high percentage of bone changes involving the lower spine at or near the kidney regions; these changes range from mild hypertrophic spondylitis to a high-grade increase in bone tissue, resulting in bridging and local erosions of the articular surfaces of the vertebral bodies. Blaine considers that these findings in the absence of stone shadows suggest very strongly the cause of the symptoms which lead one to suspect lithiasis, but which evidently are due to spondylitis.

On Thursday morning Dr. Hollis E. Potter, of Chicago, demonstrated his application of the Bucky principle of diaphragming for fluoroscopy. A wheel consisting of multiple tubular diaphragms is used between the screen and the patient for the purpose of limiting the number of object-secondary rays from reaching the screen. The value of this instrument is found to be primarily for the more intimate study of the bismuth-filled viscera; it serves to eliminate diffuse screen fluorescence obtained when using high



vacuum tubes, or when penetrating the viscera of portly individuals, especially with Coolidge tubes.

Dr. F. H. Kuegle, of Omaha, offered a "Standardization of Tube and Plate Technique." This was an elaboration of a communication upon a "Coolidge Tube Bone Technique," which Dr. Kuegle contributed to the *American Journal of Roentgenology*, Vol. III, No. 5, p. 275, May, 1916.

Dr. Threlkeld-Edwards read a paper on screen technique; he advocated the use of low tubes to increase the detail of soft tissue.

On Thursday afternoon Dr. J. G. Van Zwaluwenberg, of Ann Arbor, discussed the "Capillary Circulation in the Roentgenogram of the Chest." He has observed that the collapsed lung in pneumothorax is less dense than its mate, and explains this as due to a reduction in the total blood-content. He reported upon his experimental efforts to influence pulmonary blood volume by changes in the intratracheal pressure and by the use of amyl nitrate. The presence or the absence of the hyperemia of the lungs is of great importance in the interpretation of the chest negatives, as clinically we have an increased density of the lungs in cardiac complaint and localized areas of hyper-radiability in senile emphysema. There is also a possible factor in the evaluation of findings in other conditions, such as pneumonia, bronchopneumonia, tuberculosis, foreign body, mediastinal tumors, etc.

Dr. A. B. Moore, of Rochester, Minn., presented a well-prepared and concise paper on the "Roentgen Diagnosis of Bronchiectasis." This paper was based upon the combined clinical and roentgen study of 25 cases of bronchiectasis with the findings tabulated. It was presented with a view of impressing roentgenologists and internists with the importance of the roentgen examination, not only in the diagnosis of bronchiectasis but also in determining the extent of the process. Bronchiectasis may be classified roentgenographically into three forms: (a) The infiltrative; (b) the cylindrical; (c) the sacculated.

Dr. Wm. H. Stewart, of New York, made an interesting presentation of the "Roentgen Examination as an Aid in the Differential Diagnosis Between Pneumonia and Empyema, Especially in Children." He related that the occurrence of normal or increased vocal resonance in cases of pleural effusion and the absence of bronchial breathing and increase in voice sounds in certain cases of pneumonia render differential diagnosis of these lesions most difficult. The aid of the chest tap in such cases with deceiving physical signs is frequently unsatisfactory and dangerous. Dr. Stewart presented an extensive series of cases showing the incalculable value of the roentgen examination in this differentiation. Not only is the roentgenologist able to give positive information as to the presence or absence of fluid, but he is able in the vast majority of cases to give an approximate opinion as to the quantity, to locate the accumulation, and to direct the proper entrance of the aspirating needle, should it be desired to verify the findings. This is especially valuable in sacculated empyemas. In pneumonic processes the lesion can be recognized and located roentgenographically before physical signs appear. The author recommended, where facilities are available, the routine stereoroentgenographic examination of all children suffering from diseases of the chest.

Dr. John S. Shearer, of Ithaca, discussed the quantity and dis-



tribution of secondary rays in various substances under a variety of operative conditions.

Dr. W. D. Coolidge, of Schenectady, reported the year's progress in experimental work at the Research Laboratory of the General Electric Company. He showed a new mercury vacuum pump which is a great improvement on the 'molecular' pump for exhausting hot cathode *x*-ray tubes. This new pump has been developed by Dr. Langmuir. Referring to the Coolidge tube he showed models of tubes with smaller bulbs probably about three inches in diameter; these tubes will be ready for the market in January. There was also shown a small pencil-like metal tube; it aroused a great deal of interest from those present; this type of tube would provide easy access to cavities and avoid many difficulties in applying the *x*-rays to obscure and awkward portions of the body. This tube, however, is still in an extremely early stage of experimental development, and the inventor offered very little promise of its ultimate efficiency or commercial distribution. Dr. Coolidge also showed lantern slides illustrating a high-voltage outfit which has been constructed for experimental therapy; this consists of a special transformer (without rectifying device) operating a water-cooled tube and is designed for continuous operation at 150,000 volts and 60 milliamperes. Special attention has been given to the protection of both operator and patient both from *x*-rays and electric shock.

One of the most interesting, although lengthy, presentations was by Prof. William Snow Miller, of the University of Wisconsin, upon the architecture of the lungs and its relation to the proper reading of *x*-ray plates. Dr. Miller has observed that in the newborn the sixth rib is practically at a right angle to the spine, and as individuals grow older the rib gradually angles, until at the age of thirty-six it is at an angle of  $26^{\circ}$  to the spine and at seventy-two about  $36^{\circ}$  to the spine; also the bifurcation of the trachea in the fetus is at the third dorsal vertebra and this gradually drops until at the age of forty-five it is at the seventh dorsal vertebra. The heart, diaphragm and the liver also constantly show a lower level. The main point in Dr. Miller's discussion was the constancy in the relation of bronchus, artery and vein in the lung tissue.

Dr. Kennon Dunham, of Cincinnati, made a further report upon his "Researches in the Pathology of Pulmonary Tuberculosis Related to the Reading of X-ray Plates." He stated that an understanding of pulmonary tuberculosis is dependent upon a knowledge of the anatomy of the circulatory and lymphoid tissue of the lungs, and that an accurate knowledge of the anatomy of the lungs is as essential for the *x*-ray reading of chest plates as for that of bone plates. He discussed pathology rather than the reading of plates.

At the evening session Dr. Chas. H. Mayo, President of the American Medical Association, addressed the American Roentgen Ray Society on the "X-ray in Surgical Diseases." This was a pleasing commentary upon the values of the roentgen ray in surgical diagnosis. It was a graceful acknowledgment by an eminent surgical authority of the true values of routine roentgen examination in surgical diagnosis.

Prof. Millikin, of the University of Chicago, discussed the use of the roentgen ray in the physical laboratory, and showed how

much our knowledge of the electron depended upon experimental work made possible through the use of the roentgen ray.

The President of the Society, Dr. A. W. Crane, of Kalamazoo, then read his address on "Roentgenology of the Heart." He illumined this subject with an amazing array of diagnostic facts which may be determined by the roentgen analysis of the heart shadows. He showed an apparatus of his own design which may be used both with the horizontal and vertical fluoroscope for determining the pulsations and contractions of the chambers of the heart." His address was full of new ideas and was so far ahead of previous continental monographs upon the heart shadow, that there is every indication that this presentation will assume immense importance.

On Friday morning Dr. Rollin H. Stevens, of Detroit, reported his studies on the "Blood in Deep Roentgen Therapy for Cancers." The object of this study was primarily to determine the relationship between changes in blood-counts of cancer patients being treated with the roentgen ray, and the progress of the case; and he attempted to show the probable desirability of regulating the repetition of doses of roentgen ray quite as much by the effects on the blood as on the skin, the former being more sensitive than the latter.

Dr. Arthur F. Holding, of New York, had as his subject the "Prognosis in Roentgen Treatment of Malignant Tumors and Allied Conditions," with an analysis of results observed in 658 hopelessly advanced cases. He showed the favorable influence of roentgen therapy in cases of basal cell epithelioma, lymphosarcoma, infectious granuloma, carcinoma of the breast, adenocarcinoma of the ovary, carcinoma testis of teratoid origin, pseudoleukemia, embryonal carcinoma. The prognosis of the value of roentgen therapy can frequently be made by a tissue analysis and the larger the nuclei found in the cells of the growth, the better the results from roentgen therapy. The prognosis is governed first by the histology of the growth; secondly, by the anatomical location; and thirdly, by the resistance of the patient. Dr. Holding showed startling pictures of changes in inoperable carcinoma of the breast, in most of which cases he has removed these inoperable carcinomas of the breasts by means of a method he describes as chemical coagulation.

Dr. Russell H. Boggs, of Pittsburgh, read his paper on the "Treatment of Carcinoma of Certain Pelvic Organs." He lamented the fact that up to the present time most of the cases have been referred only in the very last stage of the disease; but even in this group one would occasionally get surprising results, and nearly all received palliation. The present opinion is to operate on all operable cases of carcinoma and use radium locally, supplemented by roentgen rays. He advises radiating all advanced cases, for an occasional cure can be obtained and some can be made operable. Some of these cases are clinically cured and all visible signs of the disease disappear, but the patient may later succumb to metastasis.

Dr. George C. Johnston, of Pittsburgh, had as a title the "Treatment of Hopeless Malignancy." He described the danger of applying the term hopeless to any case of malignancy wherever situated; he made several brief reports of apparently hopeless cases of malignancy which have made a symptomatic recovery. Dr. Johnston strenuously advocates that we dispel the ideas of fatalism in



cancer and our therapeutic nihilism; there is no inevitable death, and at the same time we must guard the prognosis, as there is no inevitable cure. He discussed microscopical *versus* clinical malignancy, and the apparent relative immunity possessed by certain individuals against carcinoma. Sometimes this relative immunity to carcinoma is increased by radiotherapy. He stated that all surgery in malignancy was especially preventive surgery, and, while it was necessary, it was purely the removal of a growth and not the cure.

In the discussion of these therapeutic papers Dr. Holding referred to the paucity of such hopeful therapy as was reported during the afternoon in cancer meetings of general societies. Surgery to the average individual means the knife, but it really is any physical method which is applied. He referred to the insignificant doses of Murphy in his experiments in the blood changes in rats. He thought that the daily differential blood-count was likely to be impractical; at the same time he thought that the time for giving treatments would possibly be governed by other means than the mere interval of time. Reference was made to the value of surgery when fortified by post-operative roentgen or radium therapy. He also stated that it was impractical to apply vigorous post-operative therapy over an incision because of the possible destruction of the flap.

On Friday afternoon Dr. W. P. McCarty, of Rochester, Minn., showed a number of pathological specimens of ulcer and cancer of the stomach by means of which he attempted to prove the impossibility of a roentgen predetermination between gastric ulcer or carcinoma, except by microscopical analysis.

Dr. L. T. LeWald, of New York, then presented a specially prepared report on "Syphilis of the Stomach." He has written on this subject extensively, but at this time presented an additional number of case reports.

Dr. L. G. Cole, of New York, discussed the "Indications for Surgical Intervention in Gastro-Intestinal Cases." He divided gastric cancer into four groups: (a) Inoperable (impossible); (b) unnecessary (operable); (c) for palliation; (d) for cure. He showed the futility of attempting surgical relief in cases in which the roentgen analysis predetermined the inoperability. He divided gastric ulcer into two groups: (a) those in which the ulcer has resulted in such a great deformity that the patients require surgical relief, and (b) those in which the lesion is so small that it is difficult to detect it even when the stomach is opened. This was quite an elaborate presentation, and it was impossible for Dr. Cole to cover completely his subject during the time allotted to him.

Dr. J. T. Case, of Battle Creek, Mich., then reported roentgen studies in "Pelvic Colon and Rectum." He first described the distal colon, eliminating the term sigmoid, and referring to the iliac colon as that portion between the crest of the ilium on the left side and the brim of the pelvis; the pelvic colon was that portion from the brim of the pelvis on the left side to the upper part of the rectum. He stated that it was essential for the pelvic colon to rise and fill during the progress of fecal residues and then to fall when empty. When the pelvic colon is massed in the pelvis, this is usually due to adhesions to the pelvic organs. He referred to the shackling of the pelvic colon, and described the rectal type of constipation which was most frequently due to fissure, hemorrhoids, ulcer or malignancy, to pathological factors or to rectal atony as the result of improper



hygiene. He referred to the fact that pathology in the pelvic colon frequently gives symptoms in the proximal colon. The necessity of studying these cases by both enema and an opaque meal was also indicated.

Dr. Arial W. George, of Boston, reported on "Gall-bladder Disease." He spoke of the possibility of visualizing the gall-bladder, and stated that the healthy gall-bladder cannot be demonstrated on the roentgen plate. He maintains that if the gall-bladder is visualized, it is pathological, and it is not necessary to differentiate between gallstones and gall-bladder disease. His technique requires screens and repeated exposures without the shifting of the tube. In the discussion Dr. Johnston complimented Dr. George upon the change of his title from gallstones to gall-bladder disease, stating that it was easier to visualize the gall-bladder and force operations, than when patients demanded that the stone shadows themselves be shown, and thus frequently delayed proper operative relief.

On Saturday morning Dr. Ralph W. Mills, of St. Louis, reported on the "Relation of Bodily Habitus to Visceral Form, Position, Tonus and Motility." The essential features of this paper have already been reported in the JOURNAL, Vol. XXIII, No. 4, April, 1916; Roentgen Supplement, Vol. II, No. 2, p. 68.

Dr. Frederick M. Law, of New York, read a paper on the "Interpretation of Sinus and Mastoid Plates." He called attention to the importance of having a consultation with the surgeon regarding the diagnosis and as an aid in determining the method of operating. Mention was made of several points in the surgical anatomy which may aid the surgeon in operating. Attention was called to the influence to the type of mastoids in respect to the prognosis; also the value of the ray in post-operative examination to detect incomplete operative work.

Dr. Gladys L. Carr, of Boston, then read on the "Roentgen Ray Finding in the Skull in Cases of Brain Tumors, with Special Reference to the Porus Acusticus." She referred briefly to the roentgen ray in the diagnosis of intracranial lesions, and divided the roentgen findings of localized pressure into (a) direct skull defects, especially from pressure; (b) indirect—sella changes produced by tumors of the anterior, middle and posterior fossa as a result of internal hydrocephalus correlated with a brief résumé of the clinical aspects in relation to the degree of sellar deformity.

On Friday evening the Chicago Roentgen Society entertained members and guests at a banquet at the Congress Hotel in honor of Dr. Henry Hulst, of Grand Rapids, and Dr. Walter Dodd, of Boston.

E. H. S.

## BOOK REVIEWS.

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**LOCALIZATION BY X-RAYS AND STEREOSCOPY.** By Sir James Mackenzie Davidson, M. B., C. M. Aberd., Consulting Medical Officer Roentgen Ray Department, Royal London Ophthalmic Hospital and X-Ray Department, Charing Cross Hospital; Fellow, Physical Society, President Radiology Section, Seventeenth International Congress of Medicine. With 35 Stereoscopic Illustrations on Special Plates and Other Figures in the Text. New York: Paul B. Hoeber. 1916. Price, \$3.00.

Sir James Mackenzie Davidson is a pioneer radiologist and is known wherever there is *x*-ray interest. He has never published any textbook, although his name would have sent any sort of book to unusual success. This monograph is much more than the title implies. Of course, there are chapters on the various methods of *x*-ray localization, especially stereoscopic localization, as the author is the originator of the cross-thread stereoscopic methods. But the chapters on the X-Ray Tube, Secondary Rays and X-Ray Protection, Telephone and Electro-magnet Localization, etc., are of unusual interest and value to all *x*-ray workers. This book should achieve an unusual sale, because the author knows his subject so thoroughly that he can write simply and understandingly. The war-time interest in this subject probably prompted him to its production as a patriotic duty; but at the same time he has provided the profession with a most readable roentgen book.

**DENTAL AND ORAL RADIOGRAPHY.** A Text Book for Students and Practitioners of Dentistry. By James David McCoy, D. D. S., Professor of Orthodontia and Radiography, College of Dentistry, University of Southern California, Los Angeles, California. 71 Illustrations. St. Louis: C. V. Mosby Company. 1916. Price, \$1.50.

The increasing necessity of radiography in modern dental practice has provoked an alarming amount of ephemeral literature but few textbooks. There is a wonderful field for just such a textbook as McCoy has produced, not only among dental students, but also among dental practitioners who are no doubt disappointed at the dearth of dental pages in *x*-ray textbooks. McCoy has divided his book about equally between the physics of the *x*-ray and the technique and interpretation of dental radiography. We would commend the author for his simplicity and thoroughness, a difficult combination. This book will serve admirably as a textbook for dental students and will undoubtedly interest the vast number of dentists who are installing *x*-ray apparatus in their offices.

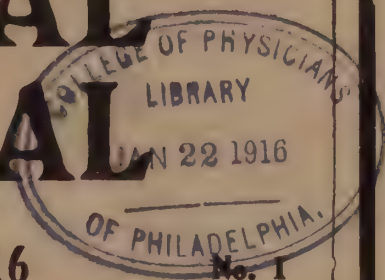
With Supplement on Roentgenology

# INTERSTATE MEDICAL JOURNAL

VOL. XXIII.

JANUARY, 1916

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- Hygienic and Dietetic Treatment of Cardiovascular Diseases.....*THOMAS E. SATTERTHWAITE*  
Congenital Cirrhosis of the Liver.....*CHARLES HUNTER DUNN*  
Another View on Ventilation.....*HENRY SEWALL*  
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(Critical Editorial Reviews of Recent Literature in Collective Form)

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The Roentgen Examination of the Appendix..... *MAXIMILIAN JOHN HUBENY*  
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Modern Radiotherapy ..... *G. KOLISCHER*  
A Modern X-Ray Laboratory.....*HUGH J. MEANS*

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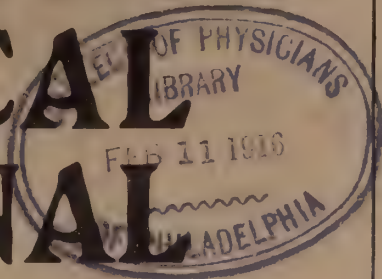
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FEBRUARY, 1916

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## ORIGINAL ARTICLES

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Protein (NX 6.25)	-	-	-	-	10.48%
Starch (Diastase Conversion)	-	-	-	-	65.26%
DEXTRINES	-	-	-	-	2.02%
MALTOSE (Malt Sugar)	-	-	-	-	4.23%
Crude Fiber	-	-	-	-	0.83%
Ash (Mineral Salts)	-	-	-	-	1.49%
Undetermined	-	-	-	-	0.16%
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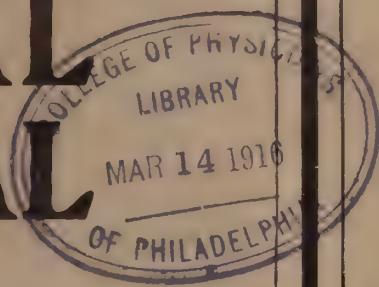
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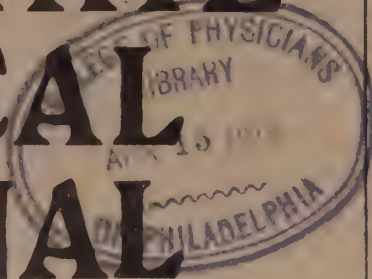
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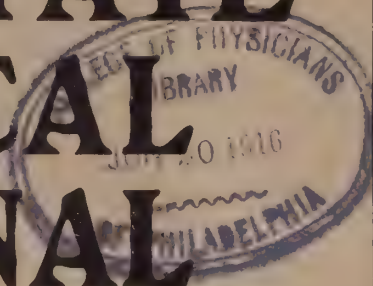
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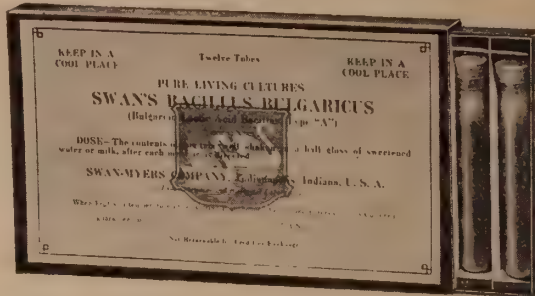
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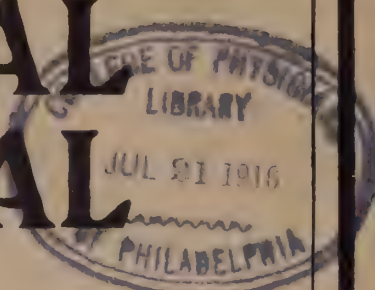
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